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ABSTRACT

Information is presented on the number and characteristics of health professionals in the United States, students preparing to enter these fields, and the schools in which they are enrolled. Developments and issues currently affecting these health personnel and the possible impact of these trends on health care delivery are considered. Included is information on accreditation, curricula, enrollments, applicant and student characteristics, student costs and financial aid, graduates, women and minority physicians, medical costs and cost containment, geographic distribution of physicians, allopathic medical education, and osteopathic medical education. Information is included on data collection and analytical activities that are currently ongoing and the areas in which further information or analyses are needed. Recommendations about program activities for nursing and public health are included. The following personnel are covered: physicians, physician assistants, dentists, pharmacists, optometrists, podiatrists, veterinarians, nursing personnel, public health personnel, and allied health personnel (including clinical laboratory technicians, dieticians, medical records technicians, occupational therapists, physical therapists, radiologic technicians, respiratory therapists, and speech, language, and hearing therapists). Summaries, data tables, and reference lists follow each of the 10 chapters dealing with a separate occupational category. (SW)

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FIFTH REPORT TO THE PRESIDENT & CONGRESS

ON THE STATUS OF HEALTH PERSONNEL

IN THE UNITED STATES

March 1986

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Health Resources and Services Administration
Bureau of Health Professions

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PREFACE

The Health Professions Educational Assistance Act of 1963, the Health Manpower Act of 1968, the Nurse Training Act of 1964, the Allied Health Professions Personnel Training Act of 1966 and their successors provided for the establishment of continuation of programs to support the education and training of qualified personnel to meet the Nation's health care needs. Under the provisions of several of these laws as amended, the Secretary of Health and Human Services was directed to assemble and submit to the President and Congress (or solely to the Congress) on a continuing basis reports on the status of health personnel in the United States. The report which follows is a continuation of the series of reports that respond to those directives.

Prior to the last report, separate reports were submitted to the Congress on health professions personnel (physicians, dentists, pharmacists, optometrists, podiatrists, and veterinarians), nursing personnel, public health personnel, and allied health personnel. However, the present report, like the prior one, synthesizes and combines the information on all of these health personnel into one document.

This report presents information on the number and characteristics of the above personnel, on the students preparing to enter these fields, and on the institutions in which they are enrolled. In addition, the report describes the important developments and issues currently affecting these health personnel and the possible impact of these trends on health care delivery. It also identifies the data collection and analytical activities that are currently ongoing and the areas in which further information or analyses are needed. In two parts of the report--those on nursing and public health--recommendations about program activities are included.

The report was prepared in the Health Resources and Services Administration's Bureau of Health Professions, Thomas D. Hatch, Director, by the Bureau's Divisions of Medicine, Dr. Daniel Masica, Director; Associated and Dental Health Professions, David B. Hoover, Director; and Nursing, Jo Eleanor Elliott, Director. It was planned, compiled, and coordinated in the Bureau's Office of Data Analysis and Management, Howard V. Stambler, Director.

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Chapter 1

Introduction

This report responds to a number of legislative authorities and represents a continuation in a series of congressionally-mandated reports on health personnel. Its purpose is to provide information on health personnel status, developments, problems and issues, with special emphasis on health personnel, supply, requirements and distribution. It is the fifth of a series of reports required by Section 708(d)(1) of the Public Health Service Act as amended by P.L. 94-484 and further amended by P.L. 95-623, and presents information on personnel in the professions of medicine (allopathic and osteopathic), dentistry, optometry, pharmacy, podiatry and veterinary medicine.

This report also provides the fifth in a series of reports on nursing supply, distribution, and requirements in response to Section 951 of P.L. 94-63 as amended by P.L. 95-623. It is the fourth in a series of mandated reports on public health personnel, prepared in response to Section 793(c) (later renumbered Section 794(c)) of the Public Health Service Act as amended by P.L. 94-484 and P.L. 95-623.

Allied health occupations are also included in this report in order to provide complete coverage of the major health fields. However, there is no specific current mandate for a report on these occupations.

The most recent previous report on health personnel was submitted to the Congress in May 1984. That report was the first to cover all the above health personnel in a single report (which comprised two volumes), replacing the previous approach of separate reports on specific groups of health personnel.

The present report continues the combined format of the last report except that it presents all information in one volume rather than two. It presents discussions of the current status of and recent developments among health personnel, as well as of problems and issues, and provides projections of future supply and requirements in the above-mentioned fields. The information presented is based on the analyses of available data as of the mid-1980s and the expert judgments and assessments by the Bureau of Health Professions of the developments and anticipated changes in these disciplines. In addition, the chapters on nursing and public health also include recommendations on program activities, as required by the legislation.

As was the case with the previous combined report, this report deals with many different occupations with widely differing education and training requirements and with non-comparable and widely differing data bases, analytical frameworks and congressional mandates. Moreover, variations in the information presented reflect the inherent variations in the context and focus of the many disciplines covered and in the issues and concerns surrounding them.

Chapter 2

Summary and Highlights

Developments in Supply

The numbers of health personnel in all fields have continued to increase through the mid-1980s, although at a somewhat lower rate than during the 1970s. This decelerated growth in the supply of health care providers largely reflects the tapering off of growth (and, in some cases actual declines) in the numbers of persons enrolling in and graduating from health professions schools/programs. However, despite the slowdown over the past few years, the supplies of health personnel now stand at levels higher than they have ever been and the growth in the numbers of health personnel continues to outpace the growth in the population.

Since the beginning of the 1980s, increases in the numbers of physicians, dentists, podiatrists, pharmacists, optometrists, veterinarians, and registered nurses have ranged from 5 percent (for optometrists) to 18 percent (for veterinarians) (Table 2-1). Similarly, the growth in the large and diverse group of allied health occupations has averaged about 13 percent since 1980 (Table 2-2). By way of comparison, the resident population of the U.S. grew by only 4 percent from 1980 to 1984. As a result, the ratios of the number of practitioners to population have continued to increase as well.

Demographic Characteristics - While the workforce in nursing and in many of the allied health occupations has historically been and continues to be primarily female, there have been significant increases in the numbers and percentages of females in professions which have traditionally been male-dominated. In several of these occupations, the rate of growth in the number of female practitioners has been substantially greater than the overall growth rate for the profession. For example, the number of female dentists has doubled and the number of female physicians (allopathic) has increased by more than 20 percent since as recently as 1980. By way of comparison, increases in the total number of dentists and physicians were about 9 percent.

Both the number and percent of female practitioners in these professions are expected to continue to grow to the end of this century. By the year 2000, female practitioners are expected to constitute significant proportions of pharmacists (40 percent), veterinarians (36 percent), optometrists (23 percent), physicians (21 percent) and dentists (16 percent) (Table 2-3).

Similarly, the physician assistant workforce appears to be moving from one which was predominately male to one made up largely of females. In the period from 1978 to 1984, the percentage of female practitioners increased from 31 percent to 41 percent of the supply. More than 60 percent of the PA student population are now females.

Practitioners from racial/ethnic minority groups continue to make up a relatively small percentage of the health care workforce. Furthermore, recent trends in the number of minority students training for careers in the health fields indicate that there will be little change in their proportionate representation among practitioners in coming years.

Geographic Distribution - The geographic distribution of health care providers (especially as it relates to the population) continues to be an area of national interest. The increase in practitioners in all occupations has resulted in increases in the practitioner-to-population ratios in every State. However, wide variations in State ratios continue to exist for most occupations and the distribution of practitioners by State has changed little. Projections of the State supplies of registered nurses and physicians indicate that although the numbers and ratios of practitioners to the population are expected to continue to increase by 1990 and beyond, State differences in the ratios are expected to remain.

For most disciplines other than medicine, there has been little documentation of the effects of the increasing supplies of practitioners on location patterns. Some evidence exists that indicates that the increased supply of physicians has improved the geographic distribution of physicians in that a larger proportion of the younger physicians are currently locating outside of the most highly populated areas. However, the total number of newly trained physicians establishing practice in rural areas is still comparatively small. The increasing number of physicians relative to the population has contributed to a decrease in the number of areas designated by the Federal Government as Primary Care Health Manpower Shortage Areas and in the number of primary care physicians needed in those areas. Nevertheless, about 14 million persons, or 6 percent of the U.S. resident population, remain underserved in the Nation's shortage areas. Although continued increases in physician supply may improve access for some population groups and for some areas, population and economic factors may remain unfavorable for the establishment of health care practices in many rural and urban poverty areas, and thus many areas and population groups will continue to remain short of adequate medical care.

Service Delivery Patterns - The health care delivery system and the surrounding national environment have undergone significant changes in the past few years. These changes have involved shifts in the settings where services are delivered as well as changes in the mechanisms for financing health care and have largely evolved out of widespread efforts to gain better control over rising health care costs. Additionally, the competition engendered by the increasing supplies of practitioners in some fields has been cited as a factor contributing to increasing numbers of practitioners providing their services through non-traditional settings. For example, the past few years have seen rapid growth in delivery settings such as health maintenance organizations (HMOs), ambulatory surgery centers, and freestanding emergency and diagnostic centers. In the area of health care financing, a major recent change has been the implementation of the Medicare prospective payment reimbursement system. Although it is too soon to assess fully the impact of this new system on health care personnel, there is some tentative evidence that it may be having some effects already, with declines in both hospital admissions and patient days, and shifts in some services from in-hospital to outpatient. The effects of changes in the reimbursement system on those health care providers such as nurses and allied health personnel, who are largely employed by hospitals, remain uncertain and it is likely that it will take several more years before an adequate judgement of its effects on health care personnel will be possible.

Developments in Education

With more than 386,000 persons enrolled in schools/programs of medicine, dentistry, podiatric medicine, optometry, pharmacy, veterinary medicine, registered nursing, and public health in academic year 1983-1984, the numbers of persons training for careers in the health occupations continue to be at or near their highest levels. However, within most disciplines, the number of total enrollments either leveled off or declined in recent years (Table 2-4). Although comparable training data for the allied health occupations during the 1980s are sparse, available data indicate a downward trend in total enrollments overall but continued high levels for some occupations.

First year enrollments for most disciplines also show a leveling off or decline in the number of students enrolled. Among the professions shown in Table 2-5, only osteopathic medicine and registered nursing have shown any significant growth since academic year 1980-1981 in the number of newly admitted students. Moreover, (as illustrated in Table 2-6), declines are anticipated in the number of graduates over the next decade in most disciplines.

Demographic Characteristics of Students - Recent trends in the gender and racial/ethnic composition of the student bodies in health professions schools largely mirror the trends in the composition of practitioners, which were discussed earlier. In essence, in recent years women are continuing to make up increasingly large percentages of the student population of those health professions that have been traditionally male dominated. In academic year 1983-1984, the percentage women made up of all students enrolled in schools of medicine, dentistry, podiatric medicine, pharmacy, optometry and veterinary medicine ranged from 19 percent in podiatric medicine to 52 percent in pharmacy (Table 2-7). Furthermore, they continue to constitute the majority of students in nursing programs, schools of public health, and many allied health programs. At the same time, changes in the racial/ethnic composition of students have not been as substantial as the gender changes and have been occurring at different paces for the individual racial/ethnic minority groups. For example, increases in the number and percentages of Black students enrolled have generally been less than those for most other minority groups, especially Asians.

Costs of Education - Rising school expenses and increased student indebtedness and their possible effects on the numbers and socioeconomic background of persons seeking careers in the health professions, as well as on the career choices of graduates from these schools, have become major topics of interest in the past few years. The average indebtedness of 1984 graduates from schools of medicine, dentistry, podiatry, and veterinary medicine were all in excess of $20,500 and may have reached as high as $44,000 for podiatric medicine, in which most schools are privately owned. Information on the effects of indebtedness on career choice is largely unavailable, and where available (as in medicine), is not conclusive. Recent information on the family income of students accepted into medical schools indicates that a larger percentage than in previous years were from the highest income category.

Graduate Education/Specialization - The recent increase in both the numbers and percentages of persons obtaining advanced training in several of the health fields has continued. In medicine and podiatric medicine the availability of residency positions in relation to the number of applicants is being examined very closely. The number of applicants to the National Resident Matching Program in 1985 exceeded the number of available entry level positions by more than 7,000. Furthermore, although more than 90 percent of U.S. medical school graduates who applied to this program continued to secure positions, the percentages of foreign medical graduates (both U.S. citizens and aliens) securing positions through this system has continued to decline. In podiatric medicine new programs and new positions have been created in the last few years, and residency positions now accommodate about two-thirds of the graduates.

The financing of graduate medical education also continues to be an important topic of discussion. Much of the discussion centers around the high-cost teaching hospitals where faculty and facilities are jointly used for undergraduate and graduate training and service delivery. The percent of medical school revenues generated from faculty patient care activities rose substantially in recent years as the percent of revenues from Federal sources declined.

In nursing, the focus on advanced training centers around the need to develop a cadre of qualified personnel from which nursing obtains its leaders and teachers and those with advanced clinical skills. The number of programs preparing teachers, administrators of nursing service, and clinical specialists more than doubled between the years of 1970-1971 and 1983-1984. Although total enrollments in these programs have increased fourfold, the percentage of full-time enrollments has decreased from 74 percent to 36 percent. Furthermore, the number of graduates in 1983 declined from the previous year.

Future Supply and Requirements

While many disciplines are expected to experience declines in the number of new additions to the practitioner pool over the course of the next several years (see Table 2-6), the supplies of health personnel are projected to continue to increase through the year 2000. The increases in supply are projected to range from 20 percent (dentistry) to 105 percent (osteopathic medicine), resulting in continued increases in practitioner-to-population ratios (Table 2-8). The numbers of MDs are projected to increase in nearly all specialties, although the growth rate will vary by specialty group. The largest increases are projected for those medical specialties other than primary care--on average a 74 percent increase between 1981 and 2000. The primary care specialties as a group are projected to increase by 53 percent by 2000. The smallest increase is projected for the surgical specialties, with an average increase of 34 percent by 2000.

Population growth, the aging of the population and other factors are expected to increase the demand for the services of health personnel in the future. As was observed in the last report, it is expected that in most of the health fields, supply and requirements in 1990 and 2000 will be in rough balance. However, the aggregate supply of physicians is expected to exceed requirements. On the other hand, persons who are trained at levels qualifying them for practice in some specialized areas, particularly in the fields of medicine, nursing, and public health may be in short supply.

Table 2-1 - Estimated Active Supply of Selected Health Personnel and Practitioner-to-Population Ratios, 1970, 1975, 1980 and 1984

	Estimated Active Supply				Percent Change		
					1970-	1975-	1980-
Health Occupation	1970	1975	1980	1984	1984	1984	1984
Physicians	326,200	384,500	457,500	501,200 1/	53.6	30.4	9.6
Allopathic (MD)	314,200	370,400	440,400	481,500 1/	53.2	30.0	9.3
Osteopathic (DO)	12,000	14,000	17,140	19,700 1/	64.2	39.7	14.9
Podiatrists	7,100	7,300	8,900	9,700 1/	36.6	32.9	9.0
Dentists	102,220	112,020	126,240	137,950	35.0	23.1	9.3
Optometrists	18,400	19,900	22,400	23,600	28.3	18.6	5.4
Pharmacists	113,700	122,800	143,800	157,000	38.1	27.9	9.2
Veterinarians	25,900	31,100	36,000	42,600	64.5	37.0	18.3
Registered Nurses	750,000	961,000	1,272,900	1,453,000	93.8	51.3	14.2
	Practitioners Per 100,000 Population						
Physicians	156.0	174.4	197.0	210.7 1/	35.1	20.8	7.0
Allopathic (DO)	150.0	167.9	189.5	202.2 1/	34.8	20.4	6.7
Osteopathic (DO)	6.0	6.5	7.5	8.5 1/	41.7	30.8	13.3
Podiatrists	3.5	3.4	4.0	4.2 1/	20.0	23.5	5.0
Dentists	49.5	51.6	55.2	58.0	17.2	12.4	5.1
Optometrists	8.9	9.2	9.8	9.9	11.2	7.6	1.0
Pharmacists	54.4	56.6	63.0	66.0	21.3	16.6	4.8
Veterinarians	12.5	14.3	15.8	18.0	44.0	25.9	13.9
Registered Nurses	366	449	560	613	67.5	36.5	9.5

1/ 1983 Data

SOURCE: For sources of data see the appopriate table within the individual chapters for the respective occupations.

Table 2-2 - Estimated Active Supply of Allied Health Personnel: Selected Years, 1970-1984[1]

Health Occupation	1970	1975	1980	1984	Percent Change			
					1970-1984	1970-1975	1975-1980	1980-1984
Allied Health Personnel	670,000	881,000	1,091,000	1,235,000	84.3	31.4	23.8	13.2
Dental Hygienists	15,000	27,000	38,000	46,000	206.7	80.0	40.7	21.0
Dental Assistants	112,000	134,000	156,000	168,000	50.0	19.6	16.4	7.7
Dental Laboratory Technicians	31,000	42,000	53,000	59,000	90.3	35.5	26.2	11.3
Dietitians	17,000	23,000	32,000	38,000	123.5	35.3	39.1	18.8
Dietetic Technicians	2,000	3,000	4,000	6,000	200.0	50.0	33.3	50.0
Medical Record Administrators	10,000	12,000	13,000	15,000	50.0	20.0	8.3	15.4
Medical Record Technicians	42,000	53,000	64,000	72,000	71.4	26.2	20.8	12.5
Medical Laboratory Workers:	135,000	191,000	249,000	278,000	105.9	41.5	30.4	11.6
Medical Technologists	(57,000)	(93,000)	(138,000)	(162,000)	184.2	63.2	48.4	17.4
Cytotechnologists	(3,000)	(6,000)	(7,000)	(8,000)	166.7	100.0	16.7	14.3
Medical Laboratory Technicians	(1,000)	(8,000)	(13,000)	(15,000)	1400.0	700.0	62.5	15.4
Other Laboratory Technicians	(74,000)	(84,000)	(91,000)	(93,000)	25.7	13.5	8.3	2.2
Occupational Therapists	17,000	21,000	25,000	30,000	76.5	23.5	19.0	20.0
Physical Therapists	15,000	20,000	31,000	37,000	146.7	33.3	55.0	19.4
Radiologic Service Workers	87,000	97,000	116,000	134,000	54.0	11.5	19.6	15.5
Respiratory Therapy Workers	30,000	43,000	56,000	62,000	106.7	43.3	30.2	10.7
Speech Pathologists and Audiologists	22,000	32,000	42,000	52,000	136.4	45.5	31.3	23.8
Other Allied Health Personnel[2]	135,000	183,000	212,000	238,000	76.3	35.6	15.8	12.3

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[1] All numbers are founded to the nearest thousand. Dut to revisions and independent estimates, some numbers may differ from those that appear elsewhere.

[2] Includes such categories as dietetic assistant, genetic assistant, operating room technician, ophthalmic medical assistant, optometric assistant and technician, orthoptic and prosthetic technologist, pharmacy assistant, occupational and physical therapy assistants, physician assistant, podiatric assistant, vocational rehabilitation counselor, other rehabilitation services, and other social and mental health services.

SOURCE: Derived from Table 12-1 of this report.

Table 2-3 - Active Supply of Female Practitioners in Selected Health Occupations, Estimated 1984 and Projected 2000

	1984		2000	
	Number	Percent of Total Practitioners	Number	Percent of Total Practitioners
Physicians (MDs & DOs)	55,800	12.0[1]	143,500	20.6
Podiatrists	350	3.6	*	*
Dentists	6,980	5.1	25,500	15.8
Optometrists	1,800	7.6	6,800	22.9
Pharmacists	37,400	23.8	76,100	40.4
Veterinarians	6,500	15.3	22,500	35.9

1/ 1981 Data

* Unavailable

SOURCE: For sources of data see the respective tables on the number of practitioners by gender in the appropriate chapters of this report.

Table 2-4 - Total Number of Students Enrolled in Schools for Selected Health Occupations: Selected Academic Years 1970-1971 through 1983-1984[1/]

	Total Number of Students				Percent Change			
Health Occupation	1970-1971	1975-1976	1980-1981	1983-1984	1970-1971 to 1983-1984	1970-1971 to 1979-1976	1975-1976 to 1983-1984	1980-1981 to 1983-1984
Medicine	42,389	59,261	70,129	72,570[2/]	71.2	39.8	22.5	3.5
Allopathic (MD)	40,238	55,818	65,189	66,748[2/]	65.9	38.7	19.6	2.4
Osteopathic (DO)	2,151	3,443	4,940	5,822[2/]	170.7	60.0	69.1	17.9
Podiatric Medicine	1,147	2,085	2,577	2,556	122.8	81.8	22.6	-0.8
Dentistry	16,553	20,767	22,842	21,428	29.5	25.5	3.2	-6.2
Optometry	2,831	3,888	4,524[3/]	4,539	60.3	37.3	16.7	0.3
Pharmacy	15,626	24,416	22,093	18,831	20.5	56.3	-22.9	-14.8
Veterinary Medicine	5,006	6,274	8,156	8,672	73.2	25.3	38.2	6.3
Nursing (RN only)[4/]	162,924	248,171	230,966	250,553	53.8	52.3	1.0	8.5
Public Health	*	6,461	8,486	7,283[2/]	*	*	12.7	-14.2

[1/] The academic year 1983-1984 is shown because comparable data for most occupations are available for that year. 1984-1985 data are given for allopathic medicine, podiatry, dentistry, pharmacy and veterinary medicine in the appropriate individual chapters for those occupations.

[2/] 1982-1983 Data

[3/] 1979-1980 Data

[4/] Trends in total nursing enrollments may incorporate changes in program lengths during the periods indicated therefore percent changes do not necessarily solely reflect growth or diminution of the student body.

SOURCE: For sources of data see the respective tables on the number of schools/programs, students, and graduates in the appropriate chapters of this report.

Table 2-5 - First Year Enrollments in Schools for Selected Health Occupations:
Selected Academic Years 1970-1971 through 1983-1984[1]

	First-Year Students				Percent Change			
	1970-1971	1975-1976	1980-1981	1983-1984	1970-1971 to 1983-1984	1970-1971 to 1979-1976	1975-1976 to 1983-1984	1980-1981 to 1983-1984
Medicine	11,971	16,333	18,682	18,936[2]	58.2	36.4	15.9	1.4
Allopathic (MD)	11,348	15,295	17,186	17,254[2]	52.0	34.8	12.8	0.4
Osteopathic (DO)	623	1,038	1,496	1,682[2]	170.0	66.6	62.0	12.4
Podiatric Medicine	351	641	695	689	96.3	82.6	7.5	-0.9
Dentistry	4,565	5,763	6,030	5,274	15.5	26.2	-8.5	-12.5
Optometry	884	1,057	1,209[3]	1,187	34.3	19.6	12.3	-1.8
Pharmacy	5,864	8,710	7,551	6,715	14.5	48.5	-22.9	-11.1
Veterinary Medicine	1,430	1,712	2,239	2,284	59.7	19.7	33.4	2.0
Nursing (RN only)	78,524	112,174	110,201	120,579[3]	53.6[3]	42.9	7.5[3]	9.4[3]

[1] The academic year 1983-1984 is used because comparable data for most occupations are available for that year. 1984-1985 data are given for allopathic medicine, podiatry, dentistry, pharmacy, and veterinary medicine in the appropriate individual chapters for those occupations.

[2] 1979-1980 Data

[3] 1982-1983 Data

SOURCE: For sources of data see the respective tables on the number of schools/programs, students and graduates in the appropriate chapters of this report.

Table 2-6 - Actual and Projected Annual Graduates from Selected Health Professions Schools/Programs: Academic Years 1983-1984 through 1999-2000

Academic Year	Medicine (MD + DO)	Dentistry	Pharmacy	Nursing (RN only)
1983-1984	17,800	5,300	6,000	82,200
1984-1985	18,500	5,400		82,700
1985-1986	18,500	5,100	5,600	78,700
1986-1987	18,400	4,900	5,800	78,800
1987-1988	18,300	4,700	5,800	77,800
1988-1889	18,100	4,500	5,800	76,500
1989-1990	17,900	4,400	5,800	75,300
1990-1991	17,800	4,300	5,800	73,900
1991-1992	17,600	4,200	5,800	72,500
1992-1993	17,500	4,100	5,700	71.300
1993-1994	17,500	4,100	5,600	70,400
1994-1995	17,500	4,100	5,500	69,400
1995-1996	17,500	4,100	5,300	68,700
1996-1997	17,500	4,100	5,100	68,000
1997-1998	17,500	4,100	5,100	67,300
1998-1999	17,500	4,100	5,100	66,900
1999-2000	17,500	4,100	5,100	66,400

SOURCE: For sources of data see the appropriate table within the individual chapters for the respective occupations.

Table 2-7 - Minority and Female Total Enrollments in Health Professions Schools, Academic Years 1971-1972, 1974-1975 and 1983-1984

Number

	1971-1972				1974-1975				1983-1984			
	Total	Black	Other Minority	Women	Total	Black	Other Minority	Women	Total	Black	Other Minority	Women
Medicine												
Allopathic	43,650	2,055	1,017	4,755	53,074	3,355	2,205	9,661	67,327	3,892	6,906	20,635
Osteopathic	2,304	27	36	79	3,139	46	43	267	5,822[1]	116[1]	239[1]	1,317[1]
Podiatric Medicine	1,268	27	13	15	2,085[2]	58[2]	67[2]	100[2]	2,556	169	127	475
Dentistry	17,305	597	484	334	20,146	945	878	1,361	21,428	1,000	2,024	4,733
Optometry	3,094	32	149	112	3,704	73	206	351	4,561[1,3]	76[1,3]	422[1,3]	1,173[1,3]
Pharmacy[4]	16,808	618	1,027	3,949	23,235	727	1,000	7,059	18,831	943[3]	1,140[3]	9,660[3]
Veterinary Medicine	5,149	96	37	592	5,763[5]	115[5]	60[5]	1,014[5]	8,672	202	250	4,085
Nursing (RN Only)	13,127	15,500[6]	5,390[6]	203,300[6]	250,385	14,046[6]	5,808[6]	184,649[6]	234,864[7]	14,365[6,7]	8,950[6,7]	227,173[6,7]
Public Health	*	*	*	*	4,515[6]	351[6]	281[6]	2,307[6]	7,614[1,6]	403[1,6]	797[1,6]	46,241[1,6]

Percent[8]

	Total	Black	Other Minority	Women	Total	Black	Other Minority	Women	Total	Black	Other Minority	Women
Medicine												
Allopathic	100.0	4.7	2.4	10.9	100.0	6.3	4.1	18.0	100.0	5.8	10.3	30.7
Osteopathic	100.0	1.2	1.6	3.4	100.0	1.5	1.5	8.5	100.0[1]	2.0[1]	4.1[1]	22.6[1]
Podiatry	100.0	2.1	1.1	1.2	100.0[2]	2.8[2]	3.2[2]	4.8[2]	100.0	6.6	5.0	18.6
Dentistry	100.0	3.5	2.8	1.4	100.0	4.7	4.5	6.8	100.0	4.7	9.4	22.1
Optometry	100.0	1.0	4.9	3.6	100.0	2.0	5.5	9.5	100.0[1,3]	1.3[1,3]	8.5[1,3]	24.6[1,3]
Pharmacy[4]	100.0	3.8	6.2	24.0	100.0	3.2	4.4	30.4	100.0	5.1[3]	6.2[3]	52.2[3]
Veterinary Medicine	100.0	1.8	0.7	11.5	100.0	2.0[5]	1.0[5]	17.6[5]	100.0	2.3	2.9	47.1
Nursing (RN Only)	100.0	7.3	2.5	95.4	100.0	8.3	5.3	94.0	100.0	6.6[7]	4.0[7]	95.3[7]
Public Health	*	*	*	*	100.0	7.8	6.3	46.3	100.0	5.8[1]	11.4[1]	60.7[1]

*Not Available

1/ Data are for 1982-1983
2/ Data are for 1975-1976
3/ Excludes Puerto Rican Schools
4/ These are students in the final three years of pharmacy education excluding any students in pre-pharmacy years
5/ Data are for 1973-1974
6/ Data are based on those students in schools responding to questions on race/ethnicity and gender
7/ Data are for 1980-1981
8/ Percentages are based only on the total counts of students identified by race/ethnicity or gender

SOURCES: Health Resources and Services Administration, Bureau of Health Professions. Minorities and Women in the Health Fields 1984 Edition and Minorities and Women in the Health Fields, 1978. Also unpublished information from health professions schools associations.

Table 2-8 - Active Supply of Selected Health Personnel, Estimated 1984 and Projected 1990-2000

Health Occupation	Active Supply				Percent Change		
	1984	1990	1995	2000	1984-1990	1984-1995	1984-2000
Physicians	501,200 1/	587,700	645,500	696,600	17.3	28.8	39.0
Allopathic (MD)	481,500 1/	559,500	611,100	656,100	16.2	26.9	36.3
Osteopathic (DO)	19,700 1/	28,200	34,400	40,400	43.1	74.6	105.1
Podiatrists	9,700 1/	12,700	15,000	17,100	30.9	54.6	76.3
Dentists	137,950	150,800	156,800	161,200	9.3	13.7	16.9
Optometrists	23,600	25,500	27,500	29,700	8.1	16.5	25.8
Pharmacists	157,000	170,800	181,200	188,200	8.8	15.4	19.9
Veterinarians	42,600	50,400	56,800	62,700	18.3	33.3	47.2
Registered Nurses	1,453,900	1,739,100	1,932,100	2,079,400	19.6	32.9	43.0
	Practitioners Per 100,000 Population						
Physicians	202.4 1/	235.4	248.7	259.9	16.3	22.9	28.4
Allopathic (MD)	194.6 1/	224.1	235.5	244.9	15.2	21.0	25.8
Osteopathic (DO)	7.8 1/	11.3	13.3	15.3	44.9	70.5	96.2
Podiatrists	4.2 1/	5.1	5.8	6.4	21.4	38.1	52.4
Dentists	58.0	60.1	60.2	60.0	3.6	3.8	3.4
Optometrists	9.9	10.2	10.6	11.1	3.0	7.1	12.1
Pharmacists	66.0	68.1	69.6	70.0	3.2	5.5	6.1
Veterinarians	18.0	20.1	21.9	23.3	11.7	21.7	29.4
Registered Nurses	613	695	743	775	13.4	21.2	26.4

1/ 1983 Data

SOURCE: For sources of data see the appropriate table within the individual chapters for the respective occupations

Table 2-9 - Supply and Requirements for Selected Health Occupations
1984 Supply and Projections to 1990 and 2000

	1984	1990		2000		Percent Increase 1984-2000	
	Supply	Supply	Requirements	Supply	Requirements	Supply	Requirements
Medicine	501,200[1/]	587,700	541,000	696,600	618,800	39.0	23.5
Optometry	23,600	25,500	26,000	29,700	30,400	25.8	28.8
Pharmacy[2/]	151,300	162,800	162,000	176,800	176,000	16.9	16.3
Veterinary Medicine	42,600	50,400	48,000	62,700	59,500	47.2	39.7
Nursing[2/]							
RN	1,215,400	1,454,000		1,750,000		44.0	
Historical Trend	---	---	1,414,000	---	1,683,000	---	38.5
Criteria Based	---	---	1,733,000	---	2,328,000	---	91.5
LPN/LVN	490,300	608,000		756,000		54.2	
Historical Trend	---	---	527,000	---	720,000	---	46.8
Criteria Based	---	---	321,000	---	423,000	---	-13.7

[1/] 1983 Data
[2/] Full-time equivalents

---Not Applicable

SOURCE: For source of data see the individual chapters for the respective occupations.

Chapter 3

MEDICINE

Introduction

This chapter presents the recent developments in physician supply, education and competency assurance. It also includes forecasts of physician supply and requirements. The primary focus of the chapter is to provide the most current information since the publication of the previous report (USDHHS, May 1984), and then place the recent developments in context with historical trends.

Developments in Physician Supply

The environment for the delivery of health services has changed appreciably. Since 1970, the number of physicians has grown faster than the population, shifting focus from adequacy of supply to balances in distribution. Concomitantly, health care costs have escalated, drawing attention to the physician's contribution to those costs. The following section explores these notable changes through discussions of current supply levels, both for allopathic (MD) and osteopathic (DO) physicians; changes in specialty, activity and geographic distributions; participation of foreign medical graduates; and the contributions of women and minorities. It reviews changing characteristics of the practice setting, including the content of visits; financing, quality and utilization of services; productivity; and access to care. Finally, this section examines the impact of an expanded supply of physicians in the U.S. and other countries.

Allopathic Physicians: Current Supply, Specialization and Activity Status

Supply. The supply of allopathic physicians continued to grow between 1980 and 1983 at about 3 percent per year, a slightly slower pace than the average 4 percent per year observed in the 1970's. Preliminary data from the American Medical Association (AMA) showed that as of December 31, 1983, there were 519,546 allopathic physicians in the U.S. representing an 11.1-percent increase since 1980 and outpacing population growth by more than threefold. The pool of active MDs, however, grew by approximately 9.3 percent. As of 1983, an estimated 481,454 MDs were active, for a ratio of 202 active physicians per 100,000 population.

Supply of Allopathic Physicians: Total, Active and Ratio per
100,000 Population, 1970, 1980 and 1983

	1970	1980	1983	Percent Change 1980-1983
Total MDs				
Number	334,028	467,679	519,546	11.1
Ratio	148	195	218	
Estimated Active a/				
Number	314,196	440,357	481,454	9.3
Ratio	150	179	202	
Population b/ (in 100,000s)	208,066	231,666	238,160	2.8

a/ Includes AMA-defined professionally active MDs plus about 90 percent of MDs not classified or with unknown addresses reclassified as active.

b/ Includes U.S. resident population, armed forces overseas, and civilian population of the U.S. possessions, as of July 1.

SOURCES: American Medical Association. National Physician Trends from 1970-82, November 1984 and unpublished AMA data.

Young physicians continue to represent a substantial and slowly growing proportion of all physicians. As of 1982, 42 percent of all MDs were under the age of 40, and more than 40 percent of all MDs had graduated since 1970. In 1970, less than 40 perent of MDs were under age 40 (AMA, Nov. 1984b). This younger pool altered other distributions such as activity status, specialty, gender, productivity, income and board certification. The number of board-certified physicians grew by 135 percent since 1970, from one-third of all physicians to 51 percent in 1980 and to 55 percent in 1982.

Specialization. Since 1980, little change occurred numerically in the ranking of the specialties, and only slight changes have been observed since 1970. As of 1983, internal medicine headed the list, followed by general/family practice, general surgery, pediatrics, psychiatry, obstetrics/gynecology, anesthesiology, orthopedic surgery and pathology.

Most Popular 1983 Specialties:
Number of MDs and Rank, 1970, 1980 and 1983

Specialty	1970 Number	1970 Rank	1980 Number	1980 Rank	1983 Number	1983 Rank	Percent Change 1980-1983
Internal Medicine	41,872	2	71,531	1	82,462	1	15.3
General/Family Practice	57,948	1	60,049	2	64,154	2	6.8
General Surgery	29,761	3	34,034	3	36,323	3	6.7
Pediatrics	17,941	6	28,342	4	32,831	4	15.8
Psychiatry	21,146	4	27,481	5	30,763	5	11.9
Obstetrics/ Gynecology	18,876	5	26,305	6	29,307	6	11.4
Anesthesiology	10,860	7	15,958	7	20,003	7	25.3
Orthopedic Surgery	9,620	9	13,996	8	16,193	8	15.7
Pathology	10,483	8	13,642	9	14,294	9	4.8

SOURCES: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983 and previous editions and unpublished AMA data.

Of particular note was the continuing decline in the percentage of general/family practitioners among all MDs, from 12.8 percent in 1980 to 12.3 percent in 1983. This decline, coupled with the moderated growth in internal medicine and pediatrics, has produced a relatively constant rate of growth in the primary care specialties, not only since 1980, but throughout the 1970's. This relatively moderate rate of growth is exacerbated when all relevant subspecialties such as hematology and oncology are subtracted from the pediatrics and internal medicine categories. Excluding the subspecialties, the percentage of primary care MDs decreased from 34.5 percent in 1980 to 30.6 percent in 1983--a figure representing 0.5 percent fewer primary care MDs than the previous year (subspecialty data are available only for recent years).

Supply of MDs in General/Family Practice,
Internal Medicine and Pediatrics, 1982 and 1983

Specialty	1982 Number	1982 Percent of All MDs	1983 Number	1983 Percent of All MDs
General/ Family Practice	62,339	12.4	64,154	12.3
General Pediatrics	29,687	5.9	30,654	5.9
Pediatrics[a]	(31,415)	(6.3)	(32,831)	(6.3)
General Internal Medicine	64,151	12.8	64,250	12.4
Internal Medicine[b]	(79,980)	(15.9)	(82,462)	(15.9)
Total Primary Care	156,177	31.1	159,058	30.6

[a] Includes certain subspecialties; see Table 3-4 for listing; excludes pediatric allergy and pediatric cardiology.

[b] Include certain subspecialties, see Table 3-4 for listing; excludes allergy, cardiovascular diseases, gastroenterology and pulmonary diseases.

SOURCES: American Medical Association. Physician Characteristics and Distributions in the U.S., 1983 edition and unpublished AMA data.

Although available data do not include a separation of all subspecialties from total internal medicine and pediatrics, it appears that younger MDs increasingly may be favoring the primary care specialties. As of 1982, 41 percent of all physicians under the age of 40 were in internal medicine, pediatrics and general/family practice, compared with 34.6 percent for MDs of all ages (AMA, Nov. 1984b). On the other hand, younger MDs, as expected, were disproportionately found in the early years of training. Whether these younger MDs will choose subspecialty training at a rate different from that of older physicians remains to be seen.

Activity Status. Few short- or long-term changes were noted in the activity distribution. Patient care MDs have represented approximately 80 percent of the total throughout the decades of the 1970's and 1980's, and non-patient care MDs have ranged from 7 to 10 percent of the total.

Whereas the number of young MDs grew by 51.6 percent from 1972 to 1982, particularly large gains were registered in the office-based practice category, which grew by 123.5 percent, and in research, which grew by 120.3 percent (AMA, Nov. 1984b).

Characteristics of Foreign Medical Graduates (FMGs)

Supply. Preliminary unpublished AMA data indicated that 112,000 FMGs were in the U.S. in 1983, representing 21.6 percent of all MDs. This percentage has changed little over the last several years.

Although the percentage of all FMGs in patient care activities dropped between 1970 and 1980, by 1983 it rose again, nearly to its 1970 level. About 60,000 FMGs were involved in office-based practice in 1983, representing 19.9 percent of all MDs in that activity; more than 26 percent of all hospital-based physicians were FMGs. FMGs continued to be more than twice as likely to be hospital-based as were U.S. (USMGs) or Canadian medical graduates (CMGs). Overall, FMG patient care activity and specialty distributions were similar to those of USMGs.

Specialization. Internal medicine continued to be the most popular specialty and showed the largest growth in percentage of FMGs. General/family practice, the second most popular, exhibited declines between 1970 and 1980 but leveled and then increased by 1982. Also pediatrics, general surgery, and pathology showed declines between 1970 and 1980 but grew slightly between 1980 and 1982. FMG representation in obstetrics/gynecology remained constant from 1970 to 1980, then grew in 1982, as did anesthesiology. The most notable increase was in pediatrics; ranked fifth in 1980 but third in 1982.

FMGs in Select Specialties: Percentage and
Rank by Size, 1970, 1980, and 1982

	Percent of Total FMGs			Rank		
Specialty	1970	1980	1982	1970	1980	1982
Internal Medicine	11.1	13.4	15.3	2	1	1
General/Family Practice	11.8	9.4	9.9	1	2	2
Pediatrics	6.2	6.7	7.6	5	5	3
Psychiatry	8.8	7.0	7.4	4	3	4
General Surgery	9.2	6.9	7.3	3	4	5
Anesthesiology	5.8	6.0	6.5	6	6	6
Obstetrics/Gynecology	5.4	5.4	5.8	8	7	7
Pathology	5.5	4.0	4.2	7	8	8

NOTE: Total FMGs in 1970, 1980, and 1982 were 57,217, 97,726, and 107,284 respectively.

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983 edition, November 1984a.

FMGs continued to account for about one-third of all MDs in anesthesiology and therapeutic radiology, and nearly one-half of those in physical medicine and rehabilitation.

Geographic Distribution. Although the percentage of FMGs in States changed from 1975 to 1983, for most States the percentage remained between 5 and 15 percent. New York, New Jersey, Illinois, Delaware and West Virginia continue to lead all States.

FMGs as a Percent of All MDs in Select States [a] and Rank, 1975 and 1983

State	1975 Percent of All MDs	1975 Rank	1983 Percent of All MDs	1983 Rank
New York	39.5	1	37.9	2
New Jersey	36.7	2	42.6	1
Illinois	34.2	3	34.8	3
Delaware	33.0	4	33.8	4
West Virginia	32.0	5	32.3	5

[a] Six States ranked highest in 1975.

SOURCES: American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1975, November 1976 and unpublished AMA data.

The trend in the number of FMGs granted initial licenses to practice in a given State is also an indicator of change in, and degree of FMG participation in patient care in that State. In 1977, when FMGs represented about 32 percent of all new licentiates, 50 percent or more of the new licentiates in Delaware, Maine, New Jersey and New York were FMGs. In 1983, when the overall FMG percentage dropped to about 23 percent (Table 3-6), Florida, Maine, Maryland and New Jersey still granted more than 50 percent of new licenses to FMGs (AMA, 1985a).

U.S. Citizen Foreign Medical Graduates (USFMGs). Significant differences have been noted in type of practice, location and specialty selection by citizenship and country of medical education (USDHHS, May 1984). These differences continued in 1981 (latest year for USFMG data), when professionally active USFMGs represented 12.0 percent of all FMGs in that category, up slightly from 11.2 percent in 1979.

As of 1981, USFMGs composed 2.5 percent of all professionally active MDs, about the same percent as in 1979. In 1981, as in 1979, more than 93 percent of all USFMGs were in patient care activities compared to the 80 percent figure for all FMGs. A slightly greater percentage of USFMGS however, was in office-based practice (62 percent) in 1981, and a slightly smaller percentage was in hospital-based practice (32 percent). Contributing to the drop in the percentage in hospital-based practice was a percentage drop in USFMGs on hospital staffs (from 12.9 to 9.8 percent), with the resident percentage holding at 22 percent.

The specialty distribution of USFMGs has changed significantly since 1979. As of 1981, they were distributed more evenly across the specialties, increasing their representation in ophthalmology, psychiatry, and pathology, while decreasing their representation in general surgery, internal medicine, and orthopedic surgery. Internal medicine still ranked first numerically, but the percentage in general/family practice rose from 10.4 to 15.6 percent to rank second ahead of general surgery. Of note was the increase in psychiatry from 5.1 to 8.2 percent.

Women MDs

Since 1970, the growth in supply of female MDs well outpaced total MD growth. Between 1970 and 1983, the pool of female MDs grew by 173.3 percent, compared to a total MD growth of 55.5 percent. However, the annual rate of growth since 1975 has tapered slightly.

Women in Allopathic Medicine: Total and Comparison to Total of Men, 1970, 1982 and 1983

	1970		1982		1983		Annual Percent Change (Not Compounded)	
Gender	Number	Percent	Number	Percent	Number	Percent	1970-1982	1982-1983
Total MDs	334,028	100.0	501,958	100.0	519,403	100.0	4.2	3.5
Women	25,401	7.6	64,247	11.6	69,421	13.4	12.7	8.1
Men	309,627	92.4	437,711	88.4	449,982	86.4	3.4	2.8

SOURCE: American Medical Association. "Physician Supply: Up 3.8 Percent in 1983." American Medical News, September 21, 1984.

During this period of significant female MD growth, their specialty and activity preferences increasingly mirrored the preferences of male MDs. For example, both showed a preference for internal medicine. As of 1982, the five major specialties practiced by women were internal medicine, pediatrics, psychiatry, general/family practice, and obstetrics/gynecology. In 1975, pediatrics headed the list (Table 3-7). The growth of women in internal medicine was paralleled by their growth in patient care activities at an annual rate averaging 15 percent. Smaller gains were found in non-patient care activities, although generally these areas had higher than average percentages of women in 1982 (Table 3-8).

Minority MDs

The most recent data, from 1980, estimated that approximately 11 percent of all MDs were minorities. Female MDs represent a significantly greater percentage of minority MDs than nonminority MDs. As of the early part of the decade, white women were estimated to represent about 11.3 percent of white MDs, but minority women represented 30.4 percent of minority MDs (USDHHS, May 1984).

Little information is available for minority specialty or practice distributions, although one study showed that black physicians substantially served black populations, with 87 percent of their private patients being black (Koba Associates, 1979). The National Medical Association, in a BHPr-sponsored study to validate the data on its masterfile, found that a significantly greater percent of black physicians practice in the primary care specialties (including or excluding obstetrics/gynecology) than do all physicians (NMA, 1985).

Physician Supply and Characteristics of Practice and Delivery

The rapid growth in the number of physicians has stimulated discussion of the degree to which competition has resulted from increased supply. This discussion has focused on changes in MD productivity, and fees and income, as well as changes in demand for, and access to services, quality/content of care and cost and expenditures. Comparable data for DOs are not available.

Productivity. If competition in health care delivery has accompanied the increased supply of MDs, standard measures of productivity would be expected to reflect a decrease. According to the most recent published data, between 1982 and 1983, the total number of office and hospital MD visits dropped for the first time, and by 2.2 percent. From 1975 to 1982, the number increased from 1 to 1.5 billion. Yet, during those same periods, total visits per MD declined by only 0.8 percent annually from 1975 to 1982, but declined by a significant 5.2 percent between 1982 and 1983 (AMA, Feb. 1984).

Although these findings could be interpreted as lending support to the presence of competition, the relationship between physician supply and workload has never been firmly established (Manard and Lewin, 1983). Productivity differences were evident by gender for both time periods, with women working fewer hours and seeing percent fewer patients per week. This variation suggests that, as the number of women MDs grows, the ratio of visits per physician can be expected to decline. Other research found a decline in visits in one health maintenance organization (HMO) where the ratio of physicians per enrollees remained constant (Luft and Trauner, 1981). Yet another study found a greater decline in productivity between 1959 and 1964, when the supply grew at a slower rate than at present (Wilson and Begun, 1977). Finally, one study found that, although 39 percent of visits were physician-initiated, only a small proportion of these visits could be explained by supply--a doubling in the physician/population ratio would result in an increase of only 1 percent of physician-initiated visits (Willensky, 1982). Thus, evidence of the impact of supply on competition found in changes in productivity is equivocal.

Fees and Income. An examination of the changing fee and income structures of MDs does reveal the existence of competition stimulated by the increase in supply. One longitudinal study found that fees increased 2.9 percent per year from 1965 to 1980, but MD visits increased only 0.7 percent (Cromwell, et al., 1983). However, this trend may be reversing for some specialties. Competition from supply growth may affect prices in specialties that are not heavily dependent upon third party reimbursement, such as general/family practice and psychiatry (Manard and Lewin, 1983) (see following section on Costs and Cost Containment).

Similar results were found for income. The real income of general/family practitioners continued to decline, as did that for physicians in the Northeast, where supply was large. The greatest increase in income was found among surgeons, with an increase of 10 percent to $138,900 between 1982 and 1983. General/family practitioners earned $68,500 in 1983 (AMA, Aug. 1984).

In addition to the roles that reimbursement and supply have had in determining incomes, setting and gender differences also contributed. Self-employed physicians earned more, as did male physicians. In 1983, they earned an average of $102,000, whereas women physicians averaged $65,200. When adjustments were made for productivity, the difference between genders declined from 56 to 24 percent. Age and specialty also were important factors in the observed gender differences. Women between the ages of 41 and 55 earned the least relative to men. A 31 percent income differential was found between male and female medical specialists, compared with only a 19-percent differential between male and female general/family practitioners (AMA, Mar. 1984).

Demand. Differing results suggest that intervening variables or other causal factors may be important in relating supply to demand. As stated previously, one study found that physician-initiated visits represented 39 percent of all visits, but a doubling in the number of MDs was needed to increase these visits by 1 percent (Willensky, 1982). Another study concluded that a doubling in the ratio of surgeons would increase the surgery rate by 10 percent (Manard and Lewin, 1983). These findings were contradicted by another study suggesting that high risk surgeries were more prevalent in areas that had high rates of surgical procedures, noting a definite impact of supply on demand (Roos, 1984).

One intervening factor may be the presence of a threshold effect of supply, an effect that may be greater in nonmetropolitan areas (Manard and Lewin, 1983). On the other hand, insurance coverage was instrumental in inducing demand. In opposition to what was hypothesized for income, fees and productivity, perhaps supply may have a positive effect on demand for only those specialties that are heavily reimbursed.

Access. With a growth in supply, access would be expected to improve. However, Medicare and Medicaid have also improved access at the same time supply was increasing. Between 1964 and 1974, the ratio of physician visits for the highest and lowest income groups fell from 1.19 to 0.84 (Sorkin, 1984). By 1982, 90 percent of the population had a usual source of care, 80 percent saw an MD within a given year, and the poor averaged more visits per year (5.9 compared to 4.7 for the average American). Nevertheless, signs of inequity remained. A national survey showed that 24 percent of the poor still perceived that they had access problems, as did 6.2 percent of the elderly, 15 percent of blacks and 11.5 percent of Hispanics (Robert Wood Johnson, 1983).

Quality and Content of Care. Determining the association between supply and quality of care is hampered by problems inherent in the measurement of quality, especially for morbidity (as opposed to mortality) indicators. One study estimated that a 10-percent increase in supply would decrease mortality by 1 percent (Manard and Lewin, 1983).

Virtually no quantifiable relationship exists between supply and morbidity, although one recent study noted the reduction in complications of surgery in more experienced hospitals (i.e., those hospitals that perform more surgery) (Flood, et al., 1984). As the supply of surgeons grows rapidly, rates of surgical procedures per physician can be expected to decline, especially in metropolitan areas. These declining rates mean that some physicians will likely have less experience, which, in turn, may produce a decline in quality.

Content of care or the attributes of visits were more quantifiable than quality. Variation in content, however, was attributable more to MD training and experience than to factors that would be affected by increases in supply such as time spent with patients or the presence of auxiliary personnel devoted to patient care (Cromwell, et al., 1983). The importance of content of care was noted in one study which showed that continuity of care was associated with fewer emergency admissions and shorter hospital stays (Wasson et al., 1984).

Cost and Expenditures. Cost differences for the same services were found between internal medicine and general/family practice, with services from internal medicine costing more. One study found that this cost differential may amount to $38.83 per visit. However, visit cost may not be a complete measure, because the duration of care (i.e., number of visits per condition) was greater for general/family practice, and this factor reduced the difference to insignificance (Bennett, et al., 1983). The relationship between supply and the rise in expenditures indicated that the rate of increased spending was less than the proportional increase in supply. If any relationship existed, increased expenditures were driven by a greater use of services corresponding to plentiful supplies of physicians. Overall, insurance coverage was a more important determinant of expenditures than supply (Manard and Lewin, 1983).

Costs and Cost Containment

Growth in national health care expenditures has moderated. Expenditures rose to $355.4 billion in 1983, representing a decrease in the average annual rate from 13.6 percent between 1976 to 1981 to 10.3 percent between 1982 to 1983. Expenditures are estimated to increase 8 percent from 1983 to 1984, and 10 percent from 1984 to 1985 to $422.6 billion. Physician services accounted for approximately 20 percent of the total, a proportion expected to hold through 1985 (Table 3-9). Fees for physician services increased at a lower average annual rate from 1981 to 1983 (3.8 percent) than did the CPI (4.6 percent) (Table 3-10).

The health care delivery strategies of the 1980's give high priority to cost containment. In addition to long-term approaches such as lifestyle changes, current short-run strategies have already produced the declining rates of growth in costs. Among the strategies that likely have affected or will directly affect physicians are new delivery organizations and physician cost containment education.

New Delivery Organizations. Alternative delivery systems emerged in the 1970's and 1980's, predominantly the Health Maintenance Organizations (HMOs) with a number of structural variations, and the Preferred Provider Organizations (PPOs), which offer services under a negotiated arrangement between provider and purchaser. (The PPO has neither a capitation nor a prepaid feature.) HMOs have recently been classified according to sponsorship, that is, whether they are free-standing, hospital-sponsored, established by a corporation for employee health care, or sponsored by an insurance carrier.

One variant of an HMO is the Individual Practice Association (IPA), often referred to as an IPA/HMO. The IPA developed in response to competition from "closed panel" HMOs, in an effort to preserve fee-for-service practice. IPA physicians usually continue to practice in their own offices and are reimbursed by the IPA on a fee-for-service basis. (Financial risk to the physicians will depend in part on what percentage of their patient population is receiving care through the IPA plan.) Additionally, IPAs may engage in marketing their services to insurance companies or corporate entities.

PPOs, relative newcomers in the field, provide services to a specified group of patients on a negotiated fee schedule. Participating physicians (and/or hospitals) are usually reimbursed on a discounted fee-for-service basis which typically approximates 80-85 percent of the "usual and customary" fee. Competitive Medical Plans (CMPs), also newcomers, are prepaid plans fiscally similar to HMOs.

Competition from such as urgent-care centers, doc-in-the-box and worksite clinics provides another source of pressure on and challenges the traditional roles of hospitals and physicians. To compete, hospitals are establishing HMOs and reviewing their resource utilization. Credentialing systems and their interrelationships with accreditation bodies also are being pressured (National Commission, 1983).

Competition among purchasers has spurred businesses to negotiate mass purchases of services and larger industries to organize their own internal health promotion and primary care services. For many businesses, insurance companies are currently serving only as fiscal agents. Some insurance companies, however, are buying and planning to operate their own hospital chains (Freedman, 1985).

Potential Impact on Primary Care Services. The models of health care delivery discussed above, with particular emphasis on cost containment, assign primary care physicians the key role of "gatekeeper." However, insurance systems historically have not emphasized reimbursement for primary care services. Preventive medicine and counseling services, among other primary care services, are not paid under most plans, and those that are reimbursed are paid at a low level. This discrepancy is widening as the primary care physician competes with other practitioners who are able to use first-contact care as a loss leader; the family physician has no offsetting high-profit services (Geyman, 1981).

Preventive Health Care Strategies. Health promotion and prevention of disease are thought to be significant means of containing costs. However, in addition to the difficulty of incorporating these services into ongoing patient care and the lack of assurance that training programs sufficiently address these areas, a dearth of cost-effectiveness evidence is frequently cited as a reason to proceed with caution. Nevertheless, certain health history questions, physical examination procedures, clinical tests and health education services have been demonstrated to contain costs (Institute of Medicine, 1978).

HCFA recognized that insurers, including Medicare, restricted coverage to services that treat, rather than prevent, illness. In an effort to test the efficacy and economy of coverage for preventive services, HCFA, in a recent study, is providing reimbursement for initiatives in preventive services that are not usually covered by Medicare (Freedman, 1985).

As part of the Rand Health Insurance Study, a smaller preventive medical care study has been designed to determine the effect of preventive care upon various categories of expenditures and outcomes. In 1984, the Robert Wood Johnson Foundation awarded a total of $15 million to five cities to assist in providing services, including preventive, in ambulatory clinics in underserved areas. HCFA provided Medicare and Medicaid waivers to allow cost-based reimbursement of all services as an incentive to use these municipal clinics. Final results will be available in 1985.

Physician Cost Containment Education. Lowering total hospital costs through physician education alone has been demonstrated to be more difficult and less promising than generally believed. Although several studies have suggested that cost containment educational interventions may have some benefit, one study demonstrated that they also have a cost. Even though cost containment education for physicians may be effective in settings where financial and organizational incentives are present, the study confirmed substantial overuse of certain hospital services. Without other cost-containing incentives, reductions of "little ticket" services may not be substantial enough to warrant the effort, especially if the impact is only temporary (Schroeder, et al., 1984).

Family Practice and Cost Containment. There is conflicting evidence whether or not family practitioners are able to care for numerous common illnesses for lower costs than are typical for internists or other specialists. One study found no cost difference when case mix was controlled (Eisenberg and Nicklin, 1981); another found no substantive difference in total patient charges when total patient encounters were considered (Bennett, et al, 1983).

Others found that "family practitioners were observed as providing more well care across all visits than were internists," but they were less likely to perform diagnostic tests and ordered as many tests per patient as did internists (USDHHS, May 1984). Variations in practice of residency trained, board-certified family practitioners and internists in southwestern Pennsylvania corroborated earlier findings that family practitioners tended to rely less on x rays and/or lab tests but more on drug therapy than internists. Family practitioners treated a younger group of patients and had a higher incidence of acute problems and trauma than internists. Internists, on the other hand, treated a larger proportion of chronically ill patients. The patient charges of family practitioners were about one-half those of internists, reflecting, in part, less time spent per patient by family practitioners (Morenstein, 1984).

Allopathic Physicians: Geographic Distribution

Recent Changes. The distribution of allopathic physicians and population across census divisions in 1982 evidenced little change from the distributions reported earlier (USDHHS, May 1984). The distributions of total physicians and population were essentially similar (Table 3-11). Between 1981 and 1982, the total population expanded 0.97 percent, whereas the total number of MDs increased 3.85 percent. The distribution of primary care MDs conformed slightly more to the population distribution than did the distribution of total physicians. The most notable difference was the slightly greater proportion of primary care physicians in the East North Central Division.

No trend or change was discernible in the aggregate proportions of non-Federal patient care physicians in metropolitan and nonmetropolitan areas from 1970 to 1982.

Trends in the Distribution of Non-Federal
Patient Care Physicians by Metropolitan Area Status

	Metropolitan		Nonmetropolitan	
Year	Number	Percent	Number	Percent
1970	217,686	85.4	37,341	14.6
1975	249,218	86.6	38,619	13.4
1980	312,687	86.4	49,228	13.6
1982	340,346	86.5	52,945	13.5

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983 edition. Chicago, 1984.

The percentage of patient care physicians in metropolitan areas remained constant and substantially in excess of the respective percentages of population. In nonmetropolitan areas, the percentage of these physicians also remained relatively stable, but below that of population. However, the gap between the percentage of physicians and the percentage of population narrowed. This latter phenomenon cannot be attributed to a faster positive rate of growth of physicians than population, but rather to a growing physician supply and a declining population.

Evidence exists that the increased supply of physicians affected the geographic distribution of young physicians. A larger proportion of young physicians were located inside less populated counties than were all physicians (USDHHS, May 1984). A continuation of this trend would ultimately lower the overall percentage of physicians in metropolitan counties. In keeping with historical trends, more general/family practitioners located in less populated counties than the more specialized internists and pediatricians, yet only 31 percent of counties with fewer than 10,000 population gained any physicians, and then, predominantly only one (Langwell and Nelson, 1984).

Distribution of Young [a] MDs by Specialty
and Year of Graduation, 1983

Physician Category	Percent Locating in-- Counties With Less Than 10,000 Population	Counties With 10,000-25,000 Population	Counties With More Than 25,000 Population
Specialty			
General Practice	11.7	44.0	44.3
Family Practice	19.3	44.7	36.0
Internal Medicine	6.3	33.3	60.4
Pediatrics	3.3	31.4	65.3
Year			
1974	10.2	43.4	46.4
1975	11.9	38.8	49.3
1976	9.7	38.4	51.9
1977	9.5	39.0	51.5
1978	10.2	42.7	47.1

[a] Under age 35.

SOURCE: Mathematica Policy Research, Inc. "Comparative Evaluation of National Health Service Corps Alumni Retained in Health Manpower Shortage Areas." Table IV.3, p. 73. November 19, 1984.

High concentrations of physicians were found in States with large populations. The District of Columbia led all of the States with a ratio of 573 physicians per 100,000 population in 1982. The four highest States had ratios ranging from 306 to 280; the comparable national ratio was 206, with the lowest ratios ranging down to 120 (Mississippi). Changes in the State ratios between 1980 and 1982 ranged from increases as high as 11.2 percent for Delaware to a slight decline for the District of Columbia (Table 3-12).

Family Practitioners. Since 1969, Federal funds have promoted a rapid expansion in the number of family practitioners. One study concluded that

> Family practitioners appear to locate in the more rural areas in much greater numbers than any other medical specialty, including general practitioners, heretofore the major provider of medical care in rural areas. They are also locating in nonmetropolitan urban areas to a much greater degree. Since the bias of more recent graduates would be for family practitioners to be found in the location of their residency programs -- most of which are in metropolitan areas -- those differences are notable. (USDHHS, Dec. 1980)

A considerably larger percentage of the 1977 to 1979 family practitioner residency graduates established practices in small urban and rural towns than did other residency graduates. This trend may persist as reflected in a recent survey of graduates of family practice residency programs and their expected practice location choices (Table 3-13). Of interest is comparing the population growth in areas that will experience an increased number of residency graduates if intentions materialize. The rural areas will experience a greater relative increase in these family practitioners than urban areas.

Comparison of Differential Change Between Population and Graduates of Family Practice Residency Programs[a] by Area

Yearly Growth Rates (Percent)

Character of Area	Population 1970-1980	Residency Graduates 1980-1984	Differential Change [b]
Urban	1.1	3.2	2.1
In urban areas	1.6	4.7	3.1
Outside of urban areas	-1.0	2.3	3.3
Rural	1.0	8.9	7.8

[a] Residency graduates responding to the survey who indicated the size of the community in which they intended to serve. The percentage of all residency graduates responding to the distribution survey varies over the years.

[b] Compound growth rate for residency graduates divided by compound growth rate for population.

SOURCES: American Academy of Family Practice and Bureau of the Census.

Family practitioners appeared to be locating in both physician-short non-metropolitan and whole-county-shortage areas more than other specialists. However, the total number of graduates establishing practice in rural areas was comparatively small.

Although studies documented the increased dispersion of physicians (especially internists and general surgeons) to underserved towns (USDHHS, May 1984), the presence of a hierarchical structure also prevailed (Lawlor and Reid, 1981). Pediatricians, specialists ranked fairly high in the hierarchical structure, were generally not found in communities that lacked lower-order specialists, such as obstetrician/gynecologists or surgical specialists. Although recent data indicate that the supply of pediatricians is increasing at a faster pace than the supply of general/family practitioners, pediatricians are unlikely to migrate to rural areas in sufficient numbers to meet the children's needs in small communities (Budetti, et al., 1982).

General/family practitioners had an income advantage in rural areas. Nationally, the average net income of general/family practices was the lowest of the specialties and, contrary to the overall gain of 6.8 percent in physician average net income, declined 4.7 percent between 1982 and 1983 (AMA, Aug. 1984). Nevertheless, general/family practitioners in rural areas had a net income advantage over their urban counterparts. Despite higher office expenses in rural areas, the number of patient visits per week was greater in these communities. However, the highest income earners in rural areas were general surgeons. Thus, an income advantage did exist for general/family practitioners and for general surgeons practicing in rural communities that could attract recent graduating MDs in these specialties (White, 1984).

Impact of Physician Supply. That physicians have responded to an increase in their supply by increasingly locating in less densely populated areas was established by several recent studies (USDHHS, May 1984). A positive correlation exists between the physician:population ratio and the movement of physicians. Although important, this factor is only one determinant in physician location and diffusion. Population growth and various economic factors are also important. The factors that affect physician diffusion remain unfavorable in many rural and urban poverty areas, which may not provide feasible sites for private practice.

"New physicians, like established physicians, who move are selecting smaller urban and non-urban centers over more populated locations." (Wunderman and Steiber, 1983). Graduating residents are influenced by the same incentives that "guide others in location decisions." A recent study substantiated that young physicians, especially generalists, are moving to more rural areas in response to the increased supply of physicians (Langwell and Nelson, 1984).

Another study identified a substantial reduction in distance to a physician for virtually all specialty categories for people living outside of population centers of at least 25,000, which amounted to about one-quarter of the total population in 1980. It found that 98 percent of the population was within 25 driving miles of a general/family practitioner, and four-fifths was within 20 straight-line miles of an internist, pediatrician, surgeon, and obstetrician/gynecologist. Even with the least accessible specialties, "almost three-fourths of the rural population needed to travel no more that 50 miles to reach such physicians, and no more than 5 percent needed to travel more than 100 miles." Although market forces may be efficacious over the next decade, "these forces could not be expected to increase notably the number of physicians in very sparsely settled areas" (Williams, et al., 1983).

Several recent studies lend support to the hypothesis that the diffusion process would not ameliorate physician shortages in sparsely settled areas or in rural poverty areas. An official in California, which ranked sixth in physician:population ratio, voiced concern that the "surplus of physicians may not help reduce the number of rural and urban areas in the State that are medically underserved" (Auditor General, California, 1983). Shortages were also noted in Southern States, specifically in rural and inner city areas and in essential specialties such as general/family practice, psychiatry and geriatrics (Southern Regional Education Board, 1985).

Others studies concluded that "the hypothesis that physician-saturated Standard Metropolitan Statistical Areas (SMSAs) will provide a spillover of physicians into less populated areas has thus far mustered only weak evidence in its support" (Fruen and Cantwell, 1982). These authors found that between 1976 and 1978, non-Federal physicians moved into counties with populations of less than 25,000 slower than into counties of all other population sizes. In a study of Nebraska counties, the physician:population ratio decreased only in counties with populations greater than 25,000 (Hynes and Givner, 1983).

The economic viability and population growth of areas are also important factors in physician diffusion. Citing several relevant studies, one study concluded that "... underserved areas with poor prospects for economic or population growth will not attract physicians" (Manard and Lewin, 1983).

Additionally, urban poverty areas appear to be experiencing a reduction in physician accessibility. A study of trends in the supply and distribution of physicians in 10 selected cities found that between 1963 and 1980, the relative increase in the number of all physicians in non-poverty areas outpaced the increase of those in poverty areas. The physician:population ratio for all MDs remained higher in the poverty areas than in the non-poverty areas but was related to the higher ratio of hospital-based physicians in poverty areas. The ratio for office-based physicians in poverty areas was less than that for non-poverty areas, declining by 6.5 percent contrasted to an increase of 14.9 percent for non-poverty areas (Kindig, et al., 1984).

Area Health Education Centers (AHECs). Since their inception in 1972, AHECs have focused on altering the training of health professionals by requiring clinical training in community settings as a means of addressing problems of access to health care. In 1984, BHPr supported six new AHEC programs. Between 1977 and 1983, 12 new programs were supported. Currently, AHECs in 17 States are receiving some form of Federal funding.

In addition to their objective of improving access to care, AHECs have continued to influence the training of health professionals in accordance with national goals. For example, in order to foster health promotion and disease prevention, the State of Maine, in conjunction with Tufts University, trained personnel in problems of substance abuse and family violence. California established a statewide network on nutrition assessment and counseling. California also coordinated with various voluntary agencies to adapt the information for Spanish-speaking populations.

In geriatrics, the University of Maryland, Baltimore Geriatric Project, initiated with Federal funds but now State-supported, sensitizes professionals to the needs of the elderly. In Massachusetts, dental students are providing treatment and oral health instruction and examinations in nursing homes and outreach centers.

In Massachusetts and New Jersey, the AHECs have also invested in computers to familiarize inner-city high school students with science and technology. These pilot investments have stimulated schools to support such activities.

AHECs have secured local financial support for their continuing efforts. For example, nurse practitioners and medical students in Colorado will continue to rotate to sites serving low-income Mexican-American families; in Connecticut, existing social services agencies have undertaken the recruitment and training of urban blacks and Hispanics into health professions; in North Dakota, telecommunications systems have been established and will be accessible to multidisciplinary health teams working in sparsely settled rural areas; and in Missouri, despite budgetary restrictions, remote site training continues as part of the clinical experiences of all medical students.

The North Carolina Legislature annually earmarks more than $20 million for AHEC activities; the South Carolina Legislature makes a similar annual commitment. The State of Kansas declined approved Federal funds in 1982 because of the availability of State support. Colorado, Illinois, and West Virginia are also receiving State support. In FY 1983, Massachusetts, New Jersey and South Dakota reported a 50-percent non-Federal fund matching; Maryland, Ohio, and Pennsylvania reported a 40-percent matching.

The Statewide Education Activities for Rural Colorado Health (SEARCH)/AHEC Program of the University of Colorado Health Sciences Center recently attempted to document the effectiveness of its continuing education and student preceptorship programs. Among its results were: (1) that a much larger percentage of preceptors were serving the medically indigent than were nonpreceptors, and a greater percentage reported that they did so at no charge; (2) the preceptor group was much more productive; and (3) the SEARCH students who received clinical training at community sites did better on Part II of the National Board of Medical Examiners exam than others.

National Health Service Corps (NHSC). The NHSC delivers primary care physician services by family physicians, internists, pediatricians, obstetrician/gynecologists, psychiatrists and emergency physicians to more than 2 million underserved persons in more than 1,600 locations. Since the inception of the program, 13,490 persons have been awarded health professions scholarships. At the end of FY 1983, 3,169 awardees had completed their obligation, and 2,865 were actively in service, equally distributed among urban and rural areas.

A total of 1,303 practitioners, the largest number ever placed at one time since the beginning of the scholarship program, began their service obligations in FY 1984. Of the total placed, 1,131 were physicians. Most of the practitioners (1,094) were assigned to the NHSC where they will serve as Federal employees or private practitioners in 49 States, Puerto Rico, the Virgin Islands, and the Trust Territory of the Pacific Islands. In addition, 209 practitioners were assigned to the Indian Health Service and the Bureau of Prisons. At the end of FY 1983, total private placements (Private Practice Option and Private Practice Assignment) numbered 1,413 of the 2,865 NHSC professionals serving in shortage areas. The NHSC is also helping organized systems of health care recruit needed providers.

In addition, the NHSC is developing a career cadre of committed individuals, who are board-certified in their specialties, to care for targeted populations for the next decade. This career cadre will staff sites which, for reasons of extreme poverty, lack of amenities, geographic isolation, or other conditions, will remain hard to serve without the assistance.

The FY 1984 appropriation for NHSC field activity was $91 million, with an additional $6.3 million for the scholarship fund. The number of NHSC scholarships has been reduced substantially in recent years, and a limited number of new awards are expected to be made in FY 1985. With the increase in number of health professionals throughout the country and their concomitant choice to practice in smaller communities, the need for large numbers of federally funded NHSC professionals will decrease. Nevertheless, there will remain pockets of health manpower shortages that the private sector will not adequately address.

Primary Care Health Manpower Shortage Areas (HMSAs). The number of designated primary care HMSAs dropped 16 percent and the number of primary care physicians needed in these areas dropped 24 percent between December 1983 and September 1984. The estimated population remaining underserved in designated primary care HMSAs amounted to 14.1 million, about 6.1 percent of the entire U.S. resident population.

Additional evidence points to an increase in the number of physicians practicing in underserved areas. The practice profile of graduates of federally funded programs for general internal medicine residencies at Boston City Hospital (Noble, 1985) and for residency training programs in general pediatrics in several different hospitals (Shelov, et al., 1984) found that these graduates established practice more frequently in medical specialties of their training and located more often in high-need urban and in rural areas than graduates of other specialties. Young physicians with NHSC experience were much more likely to locate in rural, lower populated, poorer, medically needy counties (Langwell, et al., 1984).

Nevertheless, the contribution of Federal programs aimed at alleviating geographic maldistribution should be seen in a larger context.

> In the Nation as a whole, nearly 66,000 MDs graduated between 1974 and 1978. By 1983, less than 3,000 were practicing in a primary care specialty in a non-metropolitan county containing 50,000 or less population. Thus, in spite of the geographic diffusion of the expanded supply of physicians only about 4 percent of recent graduates were practicing in the 2,111 rural counties. (USDHHS, Mar. 1985)

Osteopathic Physicians: Current Supply, Specialization, Activity Status and Geographic Distribution

Supply and Specialization. The total number of osteopathic physicians (DOs) increased from 19,686 in 1981 to 22,746 in 1984, at the same average annual rate as observed between 1975 and 1980 (Table 3-14). Approximately 90 percent were in primary care specialties (AOA, 1985). Just under 25 percent (5,613) of all DOs were board certified, and about 60 percent of them in primary care (general practice, internal medicine, pediatrics and obstetrics/gynecology). Those certified in internal medicine increased from 13.9 percent in 1982 to 14.8 percent in 1984, and those certified in general practice decreased from 40.7 percent to 38.5 percent. Both of these trends have been observed since 1980. A new board of Public Health and Preventive Medicine was first listed in 1984, certifying less than 1 percent of DOs (Table 3-15).

Activity Status. The percentage of DOs engaged in office-based patient care declined slightly (from 60.7 percent in 1982 to 57.3 percent in 1984), and the percentage in training increased somewhat (from 16.6 percent in 1982 to 18.1 percent in 1984). The non-patient care category increased from 12.0 percent in 1982 to 13.7 percent in 1984. The remaining categories showed little or no change (Table 3-16).

Geographic Distribution. Changes in the geographic distribution of DOs since 1982 were minimal. DOs continued to be concentrated in a few States, the top five remaining Michigan, Pennsylvania, Ohio, Missouri and Florida, and practiced in rural communities (Table 3-17). However, some changes in the growth rates in States may reflect a change in location patterns of recent graduates (Table 3-18). Although the 3-year change in the number of all DOs was 15.5 percent, 11 out of the 16 States with the greatest number of DOs had changes greater than that average. On the other hand, Michigan, which continued to rank first, continued its downward trend in growth with a 7.4-percent change from 1981 to 1984 (Table 3-19). The geographic distribution of DOs, when combined with that of MDs, does produce an overall physician distribution that is more evenly distributed when compared with population.

Women and Minority DOs. As of February 1985, women DOs numbered 1,866, or 8 percent of the practicing pool, a 53 percent increase and a 2-percentage point increase over the 1983 figure of 1,219 (AOA, 1985). Additional information on specialty and geographic distributions of these physicians, and data on minority practicing DOs, are not available. In order to assess the adequacy of available data on DOs, the American Osteopathic Association conducted a BHPr-supported study of available data bases. They concluded that more detailed practice characteristics information and undergraduate data be collected from annual random surveys (AOA, 1985).

Status of Physician Labor in Selected Countries Abroad

Some Western European and other developed countries,[1/] such as the U.S., are concerned about the impact of an expanding national supply of physicians (Table 3-20). Rising costs, coupled with the perception that physicians are contributors, led some developed countries to implement policies intended to modify supply and specialty distributions. These policies limit entry to medical school and/or the number of specialty training positions. However, some less-developed nations showed a relative 30-year decrease resulting in a physician:population ratio almost 1/20 that of developed nations (Kindig, 1984).

The Belgium Government restricted specialty training slots, which resulted in less than 50 percent of its graduates seeking that training. West Germany limited entry to schools by a national "numerous clause." The Swedish Parliament reduced medical school positions, and France passed legislation reducing second-year enrollments (AMA, 1984b; Schroeder, 1984).
In the U.S., "A few specialties, notably neurosurgery, have voluntarily restricted the number of resident positions offered nationally to limit numbers of practitioners, but they remain the exception" (Schroeder, 1984).

Developments in Education

The expanded physician supply and escalating health care costs changed the undergraduate and graduate medical education environments. This section emphasizes alterations in the resources employed in undergraduate and graduate settings in allopathic and osteopathic schools. It discusses students, with emphasis on the participation of women and underrepresented minorities, and sources of educational support and student assistance, with a look at indebtedness as a factor in career selections. A review of other resources includes faculty, fiscal sources, positions and programs. This section also

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[1/] Members of the Organization for Economic Cooperation and Development, a grouping used in the World Bank's annual World Development Reports.

includes a description of FMGs in graduate medical education, a discussion of international educational exchange and an exposition on the financing of education.

Resources for Undergraduate Allopathic Medical Education

Institutions. As of July 1984, the number of U.S. allopathic schools remained at 127: 124 fully accredited to award the MD degree; the University of Minnesota, Duluth, fully accredited to provide the first 2 years of undergraduate medical education; the Morehouse School of Medicine, Atlanta, GA, provisionally accredited and currently transforming from a 2- to 4-year program, graduating its first class in 1985 in cooperation with Emory University, Atlanta; Mercer University, Macon, GA, a 4-year program that received initial accreditation in June 1982 and is scheduled to graduate its first class in 1986. Only the Bayamon School of Medicine, Bayamon, PR, is in the planning stages (Crowley, et al., 1984).

The decline in development of new schools has been linked to an impending oversupply of physicians. As a partial consequence, a decline in the number of schools has been predicted by one researcher, so that by the year 2000, the number may fall below 120 (Johnson, 1983).

Of the 127 medical schools, 30 are privately owned, and the remainder are public. The ownership of the school has been linked to the propensity for its graduates to obtain postgraduate training within the same State (Igras, et al., 1983). Others noted that retention varied by State. Furthermore, although overall within-State retention is greater for graduates of public schools, support of residency positions rather than places at the undergraduate level may be more effective at improving retention because State retention is not strongly related to the latter (Manard and Lewin, 1983).

Four schools are "historically black" institutions. Their viability affects overall representation of underrepresented minorities, because these schools graduate approximately one-fourth of all such students. With the possible exception of Howard University (Washington, DC), all are in financial straits. As sources for financing medical education continue to shift to patient revenues, their financial problems are expected to increase (Hanft, et al., 1983). Thus, the plight of these institutions is especially noteworthy.

Faculty. The number of full-time faculty continued to increase, reaching 56,564 as of 1983-84, approximately 1,000 more than the year before. The full-time faculty:student ratio continued to increase in 1983-84 to 0.84, up from 0.77 in 1979-80 and 0.83 a year earlier (Crowley, et al., 1984).[2] According to the most recent published information (1981), women comprised 16 percent of faculties. Although 54 percent of men hold full professorships, only 28 percent of women do; whereas two-thirds of all faculty have MD degrees, only 45 percent of women do (Higgins and Jolly, 1982). Because the numerical difference between genders has been declining recently, and because female physicians are younger than their male counterparts, the faculty gender numerical difference may begin to diminish.

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[2] Some full-time faculty actually spend a major portion of their time in administration and/or research.

As of 1981, only 2.7 percent of faculty were underrepresented minority members (AAMC, Mar. 1985). Twenty-five percent of these members were women, attesting to the greater relative representation of minority women than minority men among medical school faculty. Minority faculty representation at minority schools has been declining. In 1975, blacks represented one-third of Howard University and Meharry Medical College (Nashville, TN) faculty, but in 1981 the percentage had declined to one-fourth (Higgins and Jolly, 1982). Despite these declines, based on medical students' responses to career survey questionnaires, the representation of women and minorities is expected to increase by the year 2000, with the percentage of women faculty anticipated to grow from 16 percent to 25 percent (Johnson, 1983).

Applicants, Acceptance Rates, and Admission Criteria. Student applicants may be responding to the perceived impending surplus of physicians as reflected in the continued decline in the applicant pool that first dropped significantly in 1978-79 to 36,636 from over 40,000 the previous year (Table 3-21). Rising tuitions also may have contributed to this decline. Although a slight increase was registered in 1984-85, the 1985-86 applicant pool showed a 9-percent decline from the previous year (AAMC, Mar. 1985).

Despite the decline in the number of applicants, the applicant:acceptance ratio remained relatively constant at 2:1 during this period (Table 3-21) However, the number of applicants may decline even more. Coupling these declines with forecasts of first-year positions, some predict a decrease in the applicant:acceptance ratio to 1.5:1. Others predict a maintenance of the 2:1 ratio as applicants with marginal chances of acceptance may begin to apply upon perceiving a dearth in applicants (Johnson, 1983).

It is anticipated that as the applicant pool declines and tuition increases, financial ability may become the overriding determinant of acceptance (Fruen, 1983; Johnson, 1983). Consequently, the average ability of students, as judged by grade point averages (GPAs) and Medical College Admissions Test (MCAT) scores, may decrease. However, the scores on these measures have not decreased with the declining applicant pool experienced to date. Furthermore, although both measures are good predictors of first-year grades and NBME exam, Part I scores (Jones and Thomae-Forgues, 1984), as well as on-time graduation and academic withdrawals (Jones and Vanyur, 1984), they may not be as good predictors of clinical ability (Cuca, et al., 1976).

Also, there is little or no relationship between MCAT scores and graduation likelihood, except for extremely low scores (below 500). Time of graduation for students with "A" or "B" GPAs did not markedly differ (Johnson, 1983). Thus, the predicted slight decrease in academic ability should not markedly affect the overall quality of students. However, according to one observer, the declining applicant pool may cause withdrawals for academic reasons to double from 24 to 50 percent of all withdrawals, although overall withdrawal rates are not expected to shift markedly (Johnson, 1983). Withdrawals remained slight as of 1982-83, with 2.2 percent withdrawing permanently.

As of 1982-83, 3.3 percent repeated the first year and 1.1 percent repeated subsequent years. By 1983-84, 3.5 percent repeated the first year and 1.1 percent repeated subsequent years (Crowley, et al., 1984). Nevertheless, overall first-year and subsequent-year repeater rates have climbed, primarily because of the combination of higher rates for minorities and the increase in their number, although increases were observed for all (Table 3-22).

Medical School Repeaters, 1973-74 and 1982-83

Year	Percent Repeaters First-Year	Percent Repeaters All Other Years
1973-74 Total	2.1	0.9
Underrepresented Minority [a]	11.3	5.2
All Other Students	1.1	0.6
1982-83 Total	3.3	1.1
Underrepresented Minority [a]	13.4	5.0
All Other Students	2.1	0.7

[a] Includes blacks, American Indians, Mexican-Americans and Mainland Puerto Ricans.

SOURCE: Association of American Medical Colleges. Unpublished data.

Enrollments. The first decline in enrollment in 37 years occurred in 1984-85. Enrollment a year earlier peaked at 67,327 but then declined to 67,016, responding to the impact of declining first-year enrollment trends since 1982-83 (AAMC, Oct. 1984). First-year enrollment in 1984-85 of 16,997 was approximately 1.6 percent lower than the 17,268 peak experienced 3 years earlier (Table 3-23).

The drop in student enrollment, like the drop in applications and places and the rise in tuition and indebtedness, may have an impact on career choices. Although evidence to date is inconclusive, increases in indebtedness might influence students to choose the more lucrative specialties in the future. On the other hand, more students may be willing to enter primary care specialties or practice in inner-city or rural underserved areas, unless a shortage of primary care residency slots alters their decision. The average socioeconomic background of students also may shift increasingly upward. (See section on Indebtedness as a Factor in Career Plans for more detail.)

Graduates. In the 1983-84 school year, nearly 16,400 students graduated from allopathic medical schools, an increase of about 3 percent from the previous year (Table 3-41). Nearly all students successfully complete their course of study. Thus, the numbers of graduates in the next few years are anticipated to reflect the stable and slightly declining trend that has been observed recently in the numbers of first-year enrollees.

Economic, Educational, and Hometown Background of Students. Although the average family income of medical students has always exceeded the national average (by 76 percent in the 1950's and 57 percent in the 1970's), it has declined in recent years. Yet, this trend may be reversing. In 1974, approximately one-third of all applicants each came from families earning less than $15,000; $15,000-$25,000, and more than $25,000, respectively (Boerner, 1977). Acceptance rates varied slightly by family income, with a low of 31 percent for the lowest income category and a high of 37 percent for the more than $25,000 income category. By 1981, however, 18.4 percent of applicants came from families earning less than $15,000; 36 percent, from families earning between $15,000 and $30,000; and almost 46 percent, from families earning more than $30,000 (income categories were expanded to account for inflation). Acceptance rates continued to vary directly with parental income, but at a more significant level: 15 percent of all acceptees came from the lowest income category and 51 percent from the highest income category (Boerner and Thomae-Forgues, 1983).

The hometown background of students has not changed appreciably over the past decade. About 60 percent of graduates in 1980 came from towns of more than 50,000 people; 71 percent of these graduates decided to practice in communities of similar size, although only 52 percent originally had so planned. Approximately 87 percent of all physicians are currently practicing in towns of that size (Johnson, 1983).

Educational Expenses, Educational Support and Student Assistance. Between 1973 and 1982, average tuition increased 351 percent for public and 370 percent for private medical school students. Both public and private schools consecutively raised tuition over the last 2 years. In the fall of 1984, the average tuition for State residents attending public schools was $3,516, up 30.9 percent from $2,686 in 1982. For non-State residents attending public schools, average tuition increased from $5,923 to $7,863, about 33 percent. In comparison, the average tuition increase in private schools between 1982 and 1984 was not as great, at about 18 percent, from $10,701 to $12,596 (Table 3-24).

With tuition and other expenses, the estimated 1984-85 first-year expenses for State residents was $10,866 compared to $15,213 for non-State residents in public schools. The average first-year expenses in private schools were $21,024 (Table 3-24). The net change for all first-year expenses over the last 3 years was 12.7 percent for residents attending public schools in their home State, 18.1 percent for nonresidents of public schools, and 15.2 percent for private school students (AAMC, Feb. 1985).

The school reliance upon revenue from tuition and fees historically has been limited. However, between 1980-81 and 1981-82, tuition revenue increased from 2.8 percent to 3.2 percent of total revenues in public schools (and held at 3.2 percent in 1982-83) and from 8.7 to 9.2 percent in private schools between 1980-81 and 1982-83. Overall, tuition and fees accounted for 5.4 percent in 1980-81, 5.7 percent in 1981-82 and 5.9 percent in 1982-83 (AMA, Sep. 1984).

Although the costs of medical education have continually increased over time, financial assistance to students declined by about 6 percent in 1982-83, then rose by more than 10 percent in 1983-84, but fewer students received financial aid in both years. Students obtained $486 million in financial assistance, an increase of $46 million or 10.5 percent over the 1982-83 amount. Awards increased to 68.8 percent of enrolled students from 67 percent the year before, but from 78 percent in 1981-82 (Table 3-25).

In 1983-84, changes were noted in the sources and amounts of available financial aid. While total scholarship funds continued to drop, by $12.6 million or 15.3 percent from the 1982-83 amount, $50.1 million more was awarded in loan funds, a 17.7-percent increase from 1982-83. The principal causes of the increase in the amount of aid available in 1983-84 were a 6.9-percent ($12.6 million) increase in the Guaranteed Student Loan (GSL)

Program and a $28.4 million increase in allotments for Health Education Assistance Loans (HEAL). HEAL loans have a relatively high rate of interest and increased 56.3 percent in 1983-84 and 50 percent in 1982-83 compared to more than 100 percent in 1981-82. This decline in the rate of increase indicates that students may have chosen other financing options (Table 3-25).

The NHSC scholarships continued to decrease, registering a 61.3-percent decline in 1983-84, the product of an ongoing phase-out of the scholarship program which began in FY 1983 by eliminating new scholarship awards.

Indebtedness as a Factor in Career Plans

Two alternative hypotheses have been given to explain the relationship between indebtedness of students and their future career decisions: (1) high indebtedness will motivate students to choose one of the higher-paying specialties and practice in large metropolitan areas; (2) high indebtedness might tend to motivate many to select a specialty requiring minimum residency training, such as one of the primary care specialties. An AAMC study of 1974-75 graduates found that students with the largest amount of debt and those planning to practice in an underserved area tended to be women, minority group members, married with children, from small towns or rural areas, and from lower income families. This study concluded that career choice was more closely related to a student's general background than to the degree of anticipated indebtedness (Mantovani et al., 1976).

Mean Debt of U.S. Senior Medical Students
for All, Public, and Private Schools, 1982-1984

	1982	1983	1984	Percent Change 1982-1984
All Schools	$21,051	$23,647	$26,496	25.9
Public Schools	18,994	20,249	22,655	19.3
Private Schools	24,214	26,535	29,522	21.9

SOURCE: Association of American Medical Colleges, Unpublished data. Division of Student Programs. February 1985.

An increase in mean debt from federally subsidized loan programs (i.e., GSL, NDSL and HPSL) had no effect on the probability of becoming a primary care physician for whites, but increased this probability for nonwhites. Regardless of race, though, the higher the level of HEAL debt, the lower the probability of selecting a primary care specialty (Bazzoli, 1984). An AAMC study of 1978 through 1982 graduates reported that there was a slight tendency for more heavily indebted seniors to select higher-paying specialties. However, the findings suggested that gender, marital status and attendance at a private school were significantly more powerful predictors of a primary care or non-primary care specialty choice than indebtedness.

This study also found that indebted students with a preference for practice in smaller towns had the lowest mean debt, whereas those with higher debts opted for large cities or the suburbs, and that scholarship recipients tended to have larger debts than nonrecipients despite their scholarships.

Among underrepresented minorities, mean debt levels were higher than those of both other minorities and nonminorities between 1979 and 1981. However, in 1982 the mean debt level for underrepresented minorities dropped below that of nonminorities and approximated that of other minorities whose debt levels had continued to rise. This phenomenon was partially explained by the fact that 1982 graduates were the first students to receive EFN scholarships and that NHSC scholarship awards peaked during the 1978-79 and 1979-80 academic years (Jolly, et al., 1984).

A BHPr-supported study by the AAMC of the 1983 graduating class showed that mean debt levels of indebted underrepresented minorities in private schools were lower than those of both other minorities and nonminorities. However, for public school students, other minorities had the lowest debt level. In both public and private schools, scholarship recipients continued to have higher mean debts and, among them, underrepresented minorities had the lowest mean debt. Among students who did not receive a scholarship, other minorities had the lowest mean debt.

This study also found that mean debt was $8,000 lower among underrepresented minorities and $4,000 lower among nonminority students attending private schools who preferred to practice in towns with populations of 10,000 or fewer residents. No substantial differences were noted between debt level and practice site preference for public school students.

Finally, the study revealed that a higher proportion of scholarship recipients were in debt compared to nonrecipients, 87 versus 80 percent. But, the dollar amounts of Federal scholarships (about 30 percent of all scholarships awarded) were substantially greater than State and other types, leaving Federal scholarship recipients less in debt. If Federal scholarship recipients were not included in the calculation of mean debt, the actual amount would be much higher than the mean of $23,647 obtained for all indebted seniors.

Allopathic Medical Schools: Acceptance, Enrollment and Socioeconomic Background of Women

Applicants. Representation of women continues to grow. Although the total number of applicants to medical school began to decline in 1982, the number of women declined less than the number of men, so that the percentage of women applicants increased from 32 percent in 1981-82 to 35 percent in 1984-85. However, female applicants declined by 8.0 percent in 1985 and males by 9.7 percent. Females still represented about 35 percent of the pool (AAMC, Mar. 1985).

Slight gender differences existed in the percentage of accepted applicants. Approximately 46 percent of women applicants and 49 percent of men were accepted each year. There were also slight differences in the academic ability of female and male students. As of 1976, women averaged 17 points higher on the verbal component of MCATs, but 4 to 32 points lower on the other subtests. These results represented a continuation of a two-decade trend which was also reflected in 1977-82 new MCAT scores (Johnson, 1983). Between 1977 and 1982, women scored equal to or higher than men on the reading skills component of the MCAT and as much as 1.5 points lower in the 15-point science scale. For 10 years before 1982, undergraduate GPAs of women accepted had been equal to or slightly higher than those of accepted men. Attrition rates between the sexes have also been similar.

Enrollment. The number of new women enrollees stabilized or slightly increased in the 1980's, whereas that of men slightly decreased each year. As a result, women have made gains in new enrollment representation, increasing from 31.7 percent in 1982-83 to 33.6 percent in 1984-85 (Table 3-23).

The success observed for women applicants and first-year enrollees is also evidenced in total enrollment data. In 1984-85, the percentage of women medical students approached one-third of the total (32 percent), an increase from 29.4 percent 2 years earlier (Table 3-23).

Socioeconomic Background. Based on data available for first-year students in 1981, it appeared that the background of women applicants and accepted applicants was similar to that of men. The largest percentage of applicants and accepted students came from families with incomes of $30,000 or more. Both the male and female percentages of accepted applicants exceeded those respective percentages of all applicants only for those from families in the highest income category (Boerner, et al., 1983). Thus, it appeared that the trend toward increasing average parental income of medical students was similar for the genders.

Allopathic Medical Schools: Acceptance, Enrollment, Selection and Retention, and Socioeconomic Background of Underrepresented Minorities

Applicants. Although gains have been observed for women, the underrepresented minorities have not faired as well, except that underrepresented minority applicants rose from 9.6 percent of all applicants in 1981-82 to 10 percent in 1984-85 (Table 3-26). This representation declined by 7.8 percent in 1985 (AAMC, Mar. 1985).

Despite the above, underrepresented minorities continued to have lower acceptance rates than the national average, holding at approximately 40 to 43 percent for the past 10 years, whereas the percentage among all applicants grew from 35 percent to 48 percent over that same period (Table 3-26). Representation was particularly low for blacks, as measured by the numerical requirement of a fourfold increase in the entering class size to reach black physician:black population parity by the year 2000 if present acceptance rates continue (McDonald, 1982).

Selection and Retention. Minority students continued to have substantially lower GPAs and MCAT scores than the average student, although the gap has recently decreased. Average science scores of blacks rose 56 points between 1972 and 1982 compared to a 30-point increase for whites, and biology scores on the new MCAT rose 0.5 points for blacks and 0.4 points for whites (Johnson, 1983).

The GPAs of underrepresented minority students remained lower, but increased faster over time.

Mean GPA of White Americans and Underrepresented Minorities,
1973 and 1982 Entering Classes

Group	1972	1982	Percent Change 1972-1982
White Americans	3.43	3.55	4.4
Underrepresented Minorities	2.86	3.08	7.7
Black Americans	2.79	3.04	9.0
Native Americans	3.16	3.16	0.0
Mexican Americans	3.03	3.18	5.0
Mainland Puerto Ricans	3.07	3.16	2.9

SOURCE: Johnson, D.G. Physicians in the Making: Personal Academic and Socioeconomic Characteristics of Medical Students from 1980 to 2000. San Francisco, 1983.

Attrition and repeater rates differed between underrepresented minorities and others. Underrepresented minorities experienced higher attrition rates, and these rates varied by gender. Although only about 2 percent of all students withdrew, regardless of gender, 7 percent of underrepresented minority women, and 11 percent of underrepresented minority men, withdrew (Johnson, 1983).

Furthermore, underrepresented minorities showed an increase in first-year repeater rates. In 1973-74, 12.1 percent of blacks repeated the first year, compared to 1.1 percent of not underrepresented minorities. This percentage for blacks grew to 17.3 percent by 1980-81, but decreased to nearly 16 percent in 1982-83 (AAMC, Feb. 1985). A study of the 1977 entering class revealed that the graduation rate for underrepresented minorities was lower than that for whites (93 versus 98 percent), and their percent taking five or more years to graduate was much greater (16 versus 3 percent) (MacDougall, 1984).

Because poorer academic background may be partially responsible for the difference in academic success between underrepresented minorities and others, many schools have installed retention activities. AAMC recently evaluated one federally funded program, the Health Career Opportunities Program (HCOP), (MacDougall, 1984). Results indicate that totally HCOP-funded schools experienced slightly lower withdrawal rates and less of an increase in repeater rates. Totally HCOP-funded schools did not exhibit a declining trend in graduation rates compared to periodically HCOP-funded and other schools. The differences not only may be attributable to degree of HCOP funding, but also to institutional commitments.

Enrollment. Representation of underrepresented minorities among first-year enrollments stabilized at slightly less than 10 percent since 1981-82 because, although their application rates increased, their acceptance rates fell below those of others (Table 3-27). Underrepresented minorities also stabilized at about 8.5 percent of all enrollees (Table 3-28).

In some measures of enrollment activity, minority women appeared to do better than non-minority women. Approximately 40 percent of minority students were women, whereas less than one-third of non-minority students were women.

Socioeconomic Background. Data on the parental income of first-year students by underrepresented minority status are available for 1981.

Parental Income of All Medical School Applicants and Accepted Applicants by Underrepresented Minority Status, 1981 (Excludes those without Income Data)[a]

	Income Level					
	$14,999 or less		$15,000-$29,999		$30,000 or more	
Applicants	Number	Percent	Number	Percent	Number	Percent
All	4,594 (1,883)	18.4 (15.3)	8,968 (4,192)	35.9 (34.0)	11,405 (6,254)	39.0 (50.7)
Whites	2,680 (1,150)	23.2 (11.4)	7,180 (3,409)	26.7 (33.8)	9,880 (5,540)	50.1 (54.9)
Underrepresented Minorities	1,102 (440)	43.3 (38.1)	871 (409)	34.2 (35.4)	574 (306)	22.5 (26.5)
Blacks	826 (305)	43.9 (37.7)	642 (282)	34.1 (34.8)	415 (223)	22.0 (27.5)
Americans Indians or Alaskan Natives	26 (7)	24.3 (17.0)	37 (17)	34.6 (41.5)	44 (17)	41.1 (41.5)
Mexican-Americans	161 (86)	40.9 (44.1)	143 (84)	36.3 (43.1)	90 (50)	22.8 (12.8)
Puerto Rican Mainland	89 (42)	54.6 (50.0)	49 (26)	30.1 (31.0)	25 (16)	15.3 (19.0)

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[a] Numbers in parentheses are the acceptance numbers and rates.

SOURCE: Boerner, R. and Thomae-Forgues, M. "Datagram: Parental Income of 1981 First-Year Medical School Applicants and Accepted Students." Journal of Medical Education 58:829-831, October 1983.

The largest percentages of applicants and accepted applicants among underrepresented minority students came from the lowest parental income category, and the lowest percentages came from the highest income category. The exception is the American Indian category, in which the largest percentage of applicants came from the highest parental income group. These data lend support to the expectation that the increasing cost of medical education may adversely affect representation of underrepresented minorities.

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Undergraduate Osteopathic Medical Education

Applicants. Only 13 of the 15 schools of osteopathic medicine reported to the American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS) in 1983-84. For the 1983 entering class, AACOMAS processed 15,171 applications from 4,051 applicants for a ratio of 3:7. Applications and applicants both rose 3 percent from 1982. However, the number of applicants has risen only slightly since the mid 1970's. The ratio of applicants to first-year seats (1,333) in the AACOMAS reporting schools declined slightly from 3.6 to 3.0 in 1983.

For the first time, the number of female applicants rose above 1,000, representing 27 percent of all applicants, up from 24.6 percent in the previous year and 14.5 percent in 1976-77 (Table 3-29). Similarly, minority applicants rose to 530 or 13 percent of all applicants, up from 11.1 percent in the previous year and 4.5 percent in 1976-77. Underrepresented minority applicants increased from 294 (7.5 percent) to 359 (8.9 percent), up from 106 or 2.9 percent in 1976-77. All ethnic groups shared in the increase; the greatest numerical increase, however, was registered among black Americans (Table 3-30).

Enrollment. In 1982, total enrollment in all 15 osteopathic schools continued to climb to 5,822, an almost 10-percent increase over the previous year, the greatest rise since 1974. First-year enrollees numbered 1,682, 6 percent higher than the previous year (Table 3-31).

The number of women enrolled in the freshman class in 1982 rose to 428, for the first time representing more than 25 percent of that class. The 1,317 women enrolled in all classes represented 22.6 percent of the student body.

Although minority representation in the freshmen class leveled off at 6.6 percent over the 2-year period ending 1981, it rose to 7.6 percent in 1982. First-year enrollment of underrepresented minorities (i.e., blacks, Hispanics and American Indians/Alaskan Natives) grew as a percentage of all freshmen, but not as substantially as the growth in enrollment of Asian-American/Pacific Islanders. Of underrepresented minorities, black Americans continued to represent a plurality at 2.3 percent, despite a significant growth in the number of Hispanics (Table 3-32).

Attrition. Although withdrawals from osteopathic schools have been small, the percentage has increased steadily. In 1982-83, 2.1 percent of the students withdrew or were dismissed, with the major reason cited as poor academic standing. This percentage was up from 1.3 in 1979-80 and 1.7 in 1981-82.

Graduates. More physicians by far graduated in 1983 than in any previous year. The 1,317 graduates represented a 30 percent increase over the previous year. Because student attrition remained only 2 percent of enrollment (although attrition increased during the past 3 years), the resultant number of graduates for the next few years is expected to increase significantly, reflecting the enrollment increases. However, the schools expect their freshman classes to stabilize at a total of 1,700. The 261 women graduating in June 1983 accounted for nearly 20 percent of that class (Table 3-31).

Educational Background of Accepted Applicants. The educational background of students has remained relatively constant. The mean GPA dropped only slightly from 3.26 to 3.23, and the MCAT average range for the science portion widened slightly.

Educational Expenses. Students' educational expenses continued upward in both private and public osteopathic schools in September 1982. The total expense in private colleges rose by 12 percent from the previous year to a level of $18,700. In contrast, expenses for in-State residents in public schools averaged $9,200, down from $9,900, and about half as much as in the private schools. More than half of all students were enrolled in their own State.

Fourteen colleges reported that their 5,428 students received nearly 1,600 scholarships, down 6.5 percent from the previous year. Of this number, the Armed Forces provided 44 percent of the scholarships, up from 42 percent, the NHSC provided 16 percent, down from 23 percent; and the States provided 15 percent, up from 10 percent. One-fourth of the scholarships, as in the previous year, were contributed by osteopathic associations and other organizations. Currently, the Association of American Colleges of Osteopathic Mediicine is conducting a BHPr-supported study to determine the impact of indebtedness on the career choices of osteopathic physicians.

Faculty. During the 1982-83 school year, there were 2,911 faculty members among the clinical science staff of the 14 reporting colleges, constituting 90 percent of the total. An additional 322 members were engaged in the basic sciences. Of the total faculty of 3,233, a slightly higher figure than in the previous year, 36 percent were working on a part-time basis and 38 percent were volunteers. Of the full-time faculty members, 66 percent were engaged in the clinical sciences, down from 88 percent in the previous year, and 34 percent worked in the basic sciences, up from 12 percent. Women constituted 7 percent of the science faculty. Just under 4 percent of the faculty for whom ethnic background was reported were minority members.

Revenues. Hospitals and clinics contributed 22 percent of all revenues for the total of all colleges, considerably down from last year's 38 percent. State appropriations amounted to 32 percent of all revenues, up from 25 percent. Tuition and fees rose from 20 percent, providing 29 percent of the school revenues. Other sources, accounting for 7.8 percent of all reported revenues, were from private gifts, medical practice plans, parent school appropriations, sales and service of educational activity, and endowment income.

Reports from 13 colleges indicated that they received $9.6 million in grants and contracts in 1982-83, 14 percent more than they received in 1981-82, but considerably lower than amounts reported for the 2 previous years. Of the revenue received in 1982-83, 56 percent continued to come from the Federal Government; 30 percent from State Governments, up from 21 percent, and the remaining 14 percent from foundations, down from 24 percent.

Graduate Allopathic Medical Education (GME)

The factors that effect GME have important implications for the future profile of medical specialty practice. The discussions and data presented pertain to residency programs accredited by the Accreditation Council for Graduate Medical Education (ACGME).

Institutional Developments: The ACGME. In 1982, the ACGME implemented several substantial changes in the standards for GME. A new document, "Essentials of Accredited Residencies in Graduate Medical Education," set forth the general requirements for accreditation of any training program. Flexible first-year programs (those sponsored by at least two accredited residency programs) were renamed "transitional programs." These programs were structured for experience in several specialties before undertaking further training in a single specialty. Also, residency programs in emergency medicine were accredited for the first time.

Characteristics of Residents. As of September 1, 1984, there were 74,495 residents on duty in 4,811 accredited programs, representing a 5.6 percent increase over the number of trainees 2 years previously and nearly a 50-percent increase since 1970-71 (Table 3-33). As a result of the growth in the number of USMGs, more physicians, particularly women, continued to pursue specialized training. The proportion of Foreign National FMGs (FNFMGs) continued to decline, whereas the number of USFMGs increased (AMA, 1985b).

In the 1984-85 academic year, nearly 43 percent (45 percent in 1982-83) of all residents were in training programs in internal medicine, general/family practice and pediatrics. If obstetrics/gynecology is included, the percentage rises to 49 percent, in contrast to only 26 percent (or 33 percent if obstetrics/gynecology is included) in 1970. Between the mid-1970's and 1984, the percent of growth among the general/family practice and pediatric specialties stopped, whereas the specialty of internal medicine showed slight growth up until 1981, when it also tapered.

Sixty-three and one-half percent of USMGs matched into internal medicine, general/family practice, pediatrics and obstetrics/gynecology programs, with internal medicine leading at 36.3 percent (AAMC, Mar. 1985). Among new 1984 residents in their first postgraduate year (PGY-1), 57 percent (11,177 of 19,539) were training in general/family practice, pediatrics and internal medicine, only a slight increase in percentage since 1982. However, this number is not a predictor of future primary care physicians in these specialties. Internal medicine, and to a far lesser degree, pediatrics, are both primary care and subspecialty training programs.

More than half of recent internal medicine residents entered subspecialty training. Although this rate was lower than the 80 percent rate in the early 1970's, a continuing increase in the ratio of practicing subspecialty internists to general internists has been predicted by one observer (Schleiter and Tarlov, 1983). Internal medicine programs also played an increasingly larger role in the general education of physicians who ultimately specialize in other fields; about 38 percent of 1981 first-year internal medicine trainees (3,000 of 8,000) were fulfilling prerequisites for other specialty programs (Schleiter and Tarlov, 1983).

By 1984-85, more than 25 percent of residents were women. Patterns of specialty choice among female residents, like those of their male counterparts, changed. Currently, larger proportions of women were specializing in internal medicine (24 percent) and pediatrics (15.4 percent), and relatively smaller proportions were in general/family practice (9.6 percent) and psychiatry (9.0 percent) than observed in the mid-1970's. Although the proportion in psychiatry declined, it still remained a specialty of preference (AMA, 1985b).

Distribution of Residents by Country
of Medical Education, Sex, and Race, 1970, 1976 and 1984

	1970		1976		1984		Percent Change
	Number	Percent	Number	Percent	Number	Percent	1970-1984
FMGs	12,943	32.8	14,933	25.8	13,337	17.9	3.0
USMGs/CMGs[a]	26,520	67.2	43,039	74.2	61,158	82.1	130.6
Women	3,929	10.0	8,416	14.7	18,603	25.0	373.5
Blacks	742	1.2	2,242	3.9	3,506	4.7	372.5
All Residents	39,463	100.0	57,972	100.0	74,495	100.0	88.8

[a] United States Medical Graduates/Canadian Medical Graduates.

Source: American Medical Association. Directory of Approved Internships and Residencies, 1971-72. Directory of Accredited Residencies, 1977-1978. 1985/1986 Directory of Residency Training Programs. Chicago, 1984.

Information on the ethnic background of residents showed that in 1984, the USMG/CMG black residents represented about 5 percent of all USMG/CMG residents. In contrast, black residents composed slightly more than 1 percent of all residents in 1970. The patterns of specialty choice among black residents between 1970 and 1984 were generally congruent with those of all residents; the percentage trained in general/family practice, internal medicine and pediatrics increased until 1982, and then leveled. During this period, the proportion trained in the surgical specialties decreased and leveled. In 1970, 1974, 1982, and 1984, 50 to 60 percent of all black residents were trained in the four specialties of internal medicine, pediatrics, general surgery, and obstetrics/gynecology.

Osteopathic Graduates in ACGME Programs. As of 1984, 1,133 graduates of osteopathic medical schools were in ACGME-accredited residency programs, a slight increase from the 1982 figure of 1,040. These residents were most frequently found in the specialties of internal medicine, family practice, obstetrics/gynecology, pediatrics, and psychiatry (AMA, 1985b). Data for 1985 from the National Resident Matching Program (NRMP) reflect continuing increases in the number of osteopathic graduates applying for allopathic training positions, but continuing decreases in the percentage of those who match.

Availability of GME Positions. The number of accredited programs increased from 4,573 in 1982 to 4,811 in 1984. This increase included recently accredited subspecialty programs in vascular surgery, neonatal-perinatal medicine and hematology. The total number of residency positions also increased, from 72,939 in 1982 to 75,084 in 1984 (AMA, 1984c). The projected number of positions for July 1985 (adjusted to include programs that did not respond to the October 1984 survey) was 78,882. About 21,200 of these positions were for PGY-1 (AMA, 1985b). Programs and positions have been added for emergency medicine and anesthesiology, which requires an additional (clinical) year.

The number of USMGs has been projected by BHPr to increase until 1986 and plateau at about 17,000, and most will enter GME. Historically, the number of offered entry-level positions has exceeded the number of USMGs. However, this margin narrowed quickly in 1984 to about 3,700; the number of entry-level positions offered was 20,411 for about 16,700 USMGs (AMA, 1984c).

Between 1982 and 1984, the number of projected PGY-1 positions increased. About 3 percent of 1984 projected positions were withdrawn, more than two-thirds before the matching date. Internal medicine, pathology and radiology programs accounted for 56 percent of all positions withdrawn. The primary reasons cited were financial (25 percent), the absence of suitable candidates (12 percent), and positions were filled by PGY-2 applicants (46 percent) (AMA, 1985b; Crowley, 1984).

NRMP data reflect an imbalance between entry-level positions (regardless of whether determined by the AMA or the NRMP) and the number of applicants. In 1985, 28,454 persons applied for 18,535 positions (or the 21,195 PGY-1 positions the AMA determined were available). Applicants for 1985 included approximately 21,511 graduates of Liaison Committee on Medical Education (LCME)-accredited schools, 2,619 USFMGs, 407 U.S. Fifth Pathway graduates and 6,943 FNFMGs.[3/] USMGs continued to match at more than 90 percent, but for the fourth year, FMG rates continued to decline. The USFMG matched rate dropped to less than 40 percent from 44 percent the previous year and 68 percent in 1981, and the FNFMG rate dropped to less than 22 percent from the 45 percent in 1981 (AAMC, Mar. 1985).

Economic Environment. The economic environment of residents has changed; the rapid increases in resident salaries of the 1970's has moderated. Their stipends have not kept pace with inflation as moderated by the CPI. Nevertheless, according to a recent study, their most prevalent problems are not financial, but educational. They work long hours, spending more than 75 percent of their time in patient care. The study concluded that these activities demonstrate their dual role--students as well as employees, and emphasize that financial hardships are accepted as the price for attaining educational goals (Hough, 1985).

[3/] Some caution is required in interpreting NRMP data, which tend to underenumerate the total number of PGY-1 positions available, as well a the entire population of first-year residents. Some medical schools an graduates, particularly FMGs, do not use the NRMP to obtain their GME position, some components (e.g., the military) do not participate, and some specialties do not use the NRMP to a large extent or at all. NRMP followup studies of USMGs indicate that over the past 6 years, 16 to 10 percent did not use the NRMP to obtain their residency position. Presently, a BHPr-supported project is underway to develop a GME data base that contains and coordinates data from these various sources.

Graduate Osteopathic Medical Education

Since 1981-82, the number of accredited hospitals providing rotating internships increased. Michigan, Ohio and Pennsylvania continued to train the largest percentage of interns (45 percent).

Summary of Intern Training, 1981-82 to 1983-84

	Number of AOA-Accredited Hospitals	Number of Intern Programs	Number of Interns in Programs
1981-82	154	101	1145
1982-83	150	107	1218
1983-84	157	109	1313

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1984-85, 76th edition. Chicago, 1984.

The number of residency positions and residents in AOA-approved osteopathic programs also increased since 1981-82.

Summary of Residency Training, 1981-82 to 1983-84

	Number of Accredited Programs	Number of AOA-Approved Positions	Number of Residents
1981-82	456	1547	783
1982-83	479	1600	995
1983-84	475	1688	1040

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1984-85, 76th edition. Chicago, 1985.

The primary care specialties of general/family practice, internal medicine, obstetrics/gynecology, and pediatrics accounted for 43.3 percent of all residents in approved osteopathic training programs in 1983-84 (Table 3-36).

FMGs in Graduate Medical Education

Between September 1983 and 1984, the percentage of FMG residents continued its small but steady decline since 1981, even though the absolute number increased slightly. Despite this overall percentage decline, the number of USFMGs continued to increase substantially, constituting the majority of FMG residents in 1984, up from nearly 40 percent in 1980 (AMA, 1985b).

FMGs in Residency Programs
by Citizenship, 1980-81 to 1984-85

Academic Year	All FMGs		U.S. Citizens		Foreign Nationals	
	Number	Percent of All Residents	Number	Percent of All FMGs	Number	Percent of All FMGs
1980-81	12,078	19.8	4,790	39.7	7,288	60.3
1981-82	13,194	19.4	5,838	44.2	7,356	55.8
1982-83	13,123	19.0	6,388	48.7	6,735	51.3
1983-84	13,221	18.4	6,990	52.9	6,231	47.1
1984-85	13,337	17.9	7,314	54.8	6,023	45.2

SOURCES: American Medical Association. Directory of Residency Training Programs, 1980/81, 1981/82, 1982/83, 1983/84, 1984/85. Chicago.

The number of USFMG and FNFMG residents in PGY-1 portend that the percentage of all USFMGs in training will continue to increase at least in the short run. Of the 3,007 PGY-1 FMGs in 1984, 60.9 percent (1,831) were USFMGs and 39.1 percent (1,176) were FNFMGs (AMA, 1985b). However, this PGY-1 percentage for USFMGs has leveled since 1983, suggesting that their future total representation may also level.

The number of FNFMGs applying for the NRMP increased by 312 percent between 1981 and 1984 to a level of 7,124, and the number of USFMGs applying increased by 169 percent from 1,241 to 3,342. These figures reflect both a growing number of repeat applicants not able to find positions and use of the matching program by FMGs who previously chose other paths to locate positions (Stimmel and Graettinger, 1984).

The number of FNFMG applicants grew faster than positions available to them, resulting in their declining match rate. Although USFMGs match at a higher rate than FNFMGs, their applicant growth had also outpaced position growth as evidenced in their match rate decline (Graettinger, 1984). In 1983, an estimated 18 percent of USMGs, 64 percent of USFMGs, and 16 percent of FNFMGs obtained PGY-1 positions outside the match (Crowley, 1984). Although the number of FMG applicants has increased, as has the number of those obtaining positions outside the match, their participation in GME has not increased; however, the USFMG proportion has increased.

The number of exchange or temporary visitor physicians applying for U.S. residency positions continued to be impacted by the entry restrictions found in Public Law 94-484 and its amendments. The Educational Commission for Foreign Medical Graduates (ECFMG), sponsoring the largest number of new-entrant FMGs (2,900) in 1973-74, sponsored only 598 physicians in 1982-83 (ECFMG, 1983).

If the future number of available positions does not increase as fast as the number of FMG applicants, some FMGs will not secure residency positions in the U.S.; thus, the pool of physicians with neither residency training nor licenses to practice is also likely to increase (Stimmel and Graettinger, 1984). This shortage may be especially acute for FNFMGs, although recent preliminary data from the Immigration and Naturalization Service indicate that the number of permanent immigrant FNFMGs has declined.

Location of Undergraduate Medical Education of USFMGs. The ECFMG is engaged in a comprehensive longitudinal study of all FMGs who took the Commission's initial certifying examination from 1969 to 1982. The number of U.S. national candidates rose from 337 in 1969 (less than 3 percent of the total) to 2,846 in 1982 (more than 20 percent of the total)--a greater than sevenfold increase. During this period, medical schools in 79 different countries provided undergraduate instruction to more than 17,500 candidates. Mexico and the Dominican Republic together trained more than half, and three Caribbean countries, Dominica, Grenada and Montserrat--undeveloped as sources of medical education less than 5 years ago--provided instruction for 1,154 candidates (10.6 percent) (Dublin, et al., 1984).

Number of U.S. National Candidates Initiating
ECFMG Examination(s) by Leading Countries of Medical Education,
1969-1973, 1978-1982, and 1969-1982

	1969-1973		1978-1982		1969-1982	
	Average Per Year	Percent	Average Per Year	Percent	Total	Percent
Mexico	149	29.9	804	37.4	6,901	39.1
Dominican Republic	4	0.8	524	24.4	2,862	16.2
Grenada	-	-	106	4.9	532	3.1
Montserrat	-	-	89	4.1	446	2.5
Dominica	-	-	35	1.6	176	1.0
74 Other Countries	345	69.3	593	27.6	6,725	38.1
Total	498	100.0	2,151	100.0	17,642	100.0

SOURCE: Dublin, T.D., et al. "Where Have All the Students Gone?" Presented to the American Epidemiological Society, March 27, 1984.

Although controversy still exists about the quality of USFMGs' undergraduate education (AAMC, 1981; Stimmel et al., 1981; USGAO 1980), data suggest that Fifth Pathway program graduates do better on licensure examinations than other FNFMGs, although their pass rates are still somewhat lower than those of USMGs (Stimmel and Smith, 1978). On the other hand, a followup study of the professional activity of 550 USFMGs 10 years after graduation reported that about 24 percent never qualified for GME or became licensed practitioners (McGuinness and Mason, 1982). Yet, USFMGs who studied in a few Caribbean countries showed high pass rates on ECFMG exams (ECFMG, 1983 and 1984).

Location of FMGs in Residency Training. Although the overall percentage of FMGs in residency programs has declined steadily, in three States--New Jersey, New York and Illinois--it still exceeded 25 percent, and it exceeded 60 percent in New Jersey. The mid-Atlantic region had the largest number (6,185), nearly half of all FMGs in residency (46.4 percent) (Table 3-37). Other significant concentrations were found in Illinois (25.7 percent) and Michigan (23.9 percent) (AMA, 1985b).

In 1983, 24.1 percent of 424 teaching hospitals reported more than 25 percent of their graduate medical students were FMGs (Council of Teaching Hospitals, 1983). These hospitals were located in 19 States and Puerto Rico. Two hospitals in New York and one in New Jersey reported that 100 percent of their house staff were FMGs. States reporting the largest number of hospitals training more than 25 percent FMG residents were: New York (31 hospitals); New Jersey (13); Illinois (10); Michigan (10); Connecticut (6); Ohio (5); Pennsylvania (5); and Maryland (4). Most of the hospitals were located in heavily urban or near urban areas--particularly the cities of New York, Pittsburgh, Philadelphia, Detroit and Chicago.

International Educational Exchange

Since World War II, the Exchange Visitor Program has been one of the major vehicles for international medical educational exchange. The legislative restrictions of 8 years ago affected entry of foreign physicians into GME via this program, particularly those sponsored for GME. In academic year 1981-82, the ECFMG sponsored only 544 physicians as new entrants. Of these, 124 were graduates of LCME-accredited schools and 50 were in the U.S. for teaching or research, leaving 370 here for residency training. Thus, there has been concern about the declining role of the U.S. in international medical educational exchange (USDHHS, Mar. 1985b).

Financing Medical Education

The financing of medical education generally mirrors the patterns of resource allocation within institutions. Although the financing of education is an issue in both allopathic and osteopathic medicine, available data come predominantly from allopathic education. The teaching of clinical medicine in university-based programs requires the sharing of faculty and facility resources for teaching both undergraduates and graduates. Joint use of faculty resources for the specialty of family medicine differs from that of other specialties in that its clinical training tends to take place in community hospitals and ambulatory care centers more than in academic medical centers. Data are not currently available on the number of shared faculty or the allocation of faculty or facility shared time between undergraduate and graduate education in family medicine or any other specialty. However, a DHHS-sponsored study is underway to provide fundamental GME financing information (Arthur Young, et al., 1985).

Use of faculty and facility resources reflects the symbiotic relationship between graduate and undergraduate medical education, but it complicates both the fiscal decisionmaking process of medical institutions and the formulation of national policy for the financing of medical education.

Revenues from all sources for allopathic medical schools increased at an average annual rate of 13 percent from 1975-76 to 1982-83 (Table 3-38). A review of these figures in 1972 constant dollars gives a more meaningful assessment of the levels, their changes, and shifts in the relative importance of the resources. Revenues increased from $2.7 to $3.9 billion; total Federal support remained at $1 billion. The research support component rose from $667 to $813 million over the first 5 years of the period and then fell in the latter years to $788 million; Federal support for other activities over the entire period declined from $322 to $198 million, or 39 percent. At the same time, revenues generated through medical services rose from $493 million to

$1.3 billion (153 percent), tuition and fees increased from $126 to $230 million (82 percent), local and State Government appropriations and funding increased from $655 to $850 million (30 percent), and revenues from other sources rose from $595 million to $1.2 billion (102 percent) (Table 3-38).

As the role of the Federal Government as a source of revenue for medical schools has diminished, as reflected in the above data, clinical faculties have become procurers of funds. Their delivery of services generates income to assure the competitiveness of their salaries with those of private sector physicians and supports the functions of the departments and institutions.

Also, hospitals are dependent upon patient care revenues for residents' support. These revenues as a percentage of residency stipends and fringe benefits varied by hospital type but revealed a strong dependence on this source: university-owned, 66 percent; major affiliated, 89 percent; limited and unaffiliated, 97 percent; State-owned, 54 percent; municipally owned, 79 percent; church-owned, 95 percent; other, nonprofit, 93 percent.

A limited financial profile of GME, as of 1978-79, showed that house staff stipends and benefits and faculty salaries totaled almost $2 billion (Table/3-39). Federal funds accounted for more than 41 percent of that figure. Payments from Medicare and the Federal share of Medicaid, $600 million in that year, represented most of the Federal support and approximately one-third of support from all sources. Among Federal support sources, it was followed by the Veterans Administration, 8 percent ($151.7 million); the BHPr residency training grants, 2 percent ($42.9 million); and National Institute of Health trainee grants and clinical fellowships, 1 percent ($11.4 million).

Data on other sources are not available. A comprehensive data set on the financial operation of GME is required to analyze the levels of revenues, their changes, and shifts in financing among the major sources of support. The data on undergraduate medical education (Table 3-38) and on GME (Table 3-39) underscore this requirement.

The recently implemented Medicare Prospective Payment System includes a passthrough for the direct cost of GME. For indirect costs, a resident-to-bed adjustment was used as a proxy for a number of factors that could increase the patient care costs in teaching hospitals, including the inability of the DRG system to distinguish adequately among patients whose illness severity differs. The passthrough covers Medicare's share of resident's stipends, and the resident-to-bed adjustment increases hospital payments.

Data from the Council of Teaching Hospitals' (COTH) 1984 survey were analyzed to determine the impact of these changes. The first year's findings indicate that teaching hospitals under prospective payment have not increased the number of residents in their programs in order to increase payments from Medicare. However, the effects the payment system will have are not clear, and COTH plans to monitor changes in the numbers and types of residents in Medicare PP/DRG hospitals (COTH, 1985).

Academic health centers supply examples of an institution's modification of its operation, based on its perception of the impact of a reduction in Federal biomedical research support. Centers are reconsidering the role of biomedical research in education, and the size of faculty and organization of instruction and activities for such education. Teaching hospitals are increasingly resistant to the support of education and clinical research activities. This inaction is heightening tension among faculty about the relative importance of education, research and patient care (AAHC, 1982).

Specialty Impact of Changes in Financing. The different earning capabilities of the various medical practice plans affects the earning potential of the various specialties. In particular, the activities of primary care departments in many teaching hospitals do not generate enough income to cover their costs, and faculty time committed to primary care generates less income than an equivalent amount of time committed to secondary and tertiary or inpatient care. As a result, primary care activities frequently must be subsidized by the institution's share of the income generated by the more lucrative plans or other institutions' funds, or by Government support. Thus, a concern for the future of primary care emerges from the notion that each specialty should be responsible for its "fair share" of the costs. With continued competitive pressure among faculty to generate more income, primary care programs are potentially at risk.

Developments in Competency Assurance

Provision of quality health care is dependent in large measure not only upon the quantity of available services as measured in numbers of practitioners or in distributions as discussed in earlier sections, but also upon the competence of practitioners. This section explores two areas contributing to the assurance of professional competence. The first area addresses competency assurance developments in the general professional education of physicians, undergraduate and graduate primary care education, and specific curricula developments in support of national health goals. The second area describes the multifaceted developments within the field of medical credentialing.

General Professional Education of Physicians

Specifically, "the nature, scope and quality of education help determine the extent to which manpower meets the public's needs" (Institute of Medicine, 1978). In 1984, the AAMC completed an extensive study of the general professional education of physicians. It found a continuing erosion of the physician's general education and expressed concern that the erosion has not been arrested but is instead accelerating. The panel concluded by affirming that all physicians, regardless of specialty, require a common foundation of knowledge, skills, values, and attitudes and that every physician should be caring, compassionate, and dedicated to patients, as well as committed to work, learning, rationality, science, and serving society (AAMC, Nov. 1984). In response to the clinical education recommendation, the BHPr initiated and supported an AAMC project to design and conduct a national conference on clinical education in the undergraduate medical curriculum, with the ultimate objective of enhancing the assurance of competence. The conference is expected to be held in late 1985.

Undergraduate Primary Care Education

Federal programs have been operating at the undergraduate and graduate levels to (1) encourage students to select primary care specialties; (2) recruit from and relocate students into health labor shortage areas; (3) strengthen educational units in primary care; and (4) adapt curricula to attend to the general provision of medical care and emphasize care for the elderly, preventive measures, nutrition, cost containment, and detection and treatment of alcoholism.

At the undergraduate level, departments of family medicine support innovations in primary care. The Federal Government has attempted to improve undergraduate medical education in family medicine by supporting the establishment of academic units and developing predoctoral student programs and faculty. During the 4 years of funding under the Establishment of Departments of Family Medicine Program, 59 schools received $41.4 million in support of their individual programs. Funds supported activities to increase curriculum time and promote scholarly activities.

From 1978 to 1983, 91 institutions received predoctoral training funds totaling $43.2 million and involving 66,022 trainees in clerkships, preceptorships, and assistantships at an average cost per trainee of about $600 (Table 3-40). Seventy-four schools received FY 1984 funds, and 42 projects ended June 30, 1984.

Between 1978 and 1984, approximately $19.4 million were expended in faculty development. Some 10,264 trainees were trained at an average cost per trainee of about $1,890. More than two-thirds have been involved in workshops and/or seminars, with the remaining in activities such as 3- to 12-month traineeships and master's degree programs. Currently 21 programs are receiving FY 1984 funds.

Despite its intent to recruit and train new faculty, in 1982 family medicine had the greatest percentage of budgeted, unfilled positions--9 percent compared to an average of 5.3 percent for other departments. A study by the University of Minnesota, supported by BHPr, is underway to determine the requisite competencies for faculty, and the appropriate program duration, presentation style, and recruitment efforts.

Aided by the above-mentioned activities, the number of American Academy of Family Practice board-certified family physicians has grown significantly since 1975, from only 7,073 to an Academy membership of 54,000 in 1980, of whom 11,000 are students.

Graduate Primary Care Education

Federal initiatives in graduate primary care education have been concentrated in the specialties of family medicine, general internal medicine and general pediatrics in both allopathic and osteopathic programs. These sponsored activities have been directed toward increasing the numbers and affecting the geographic distribution of primary care practitioners, plus aiding in the planning, development and operation of the programs themselves.

From 1972 through 1984, the Federal Government has awarded nearly $260.8 million for graduate family medicine training activities. During the period, the number of accredited family practice residency programs increased from 117 to 384 and each year an average of 58.5 percent of all residents were located in these supported programs. In 1984, 146 allopathic and 12 osteopathic programs, with 3,486 residents in training, received $20.7 million.

From 1977 through 1984, the Federal Government has awarded $119.3 million to general internal medicine/general pediatrics residency training programs. In 1984, 70 allopathic and 4 osteopathic programs received $14.5 million to train 1,456 primary care residents, 724 in general internal medicine and 732 in general pediatrics. Finally, approximately $1 million is being made available in FY 1985 to assist in meeting the costs of planning, developing and operating programs for the training of faculty physicians in general internal medicine and/or general pediatrics.

Evaluation of the Impact of Federal Initiatives in Primary Care Education

While evidence is presented in other sections of the impact of primary care training on specialty choices and practice location decisions, more rigorous impact analysis is needed. Several ongoing BHPr-sponsored studies address the impact of Federal initiatives in undergraduate family medicine education, department development and faculty training, in addition to assessments of graduate initiatives in family medicine, general internal medicine/general pediatrics. Finally, the BHPr is sponsoring the development of a data base for graduate medical education that should facilitate the above evaluation efforts.

Graduate Training in Health Promotion and Disease Prevention

An evaluation of charts in 15 university teaching hospitals' general internal medicine group practices revealed that house staff provided only 30 percent of eligible patients with an influenza vaccination, although more than 60 percent were eligible. Further, about half of women age 45 received contraceptive advice, and 50 percent of eligible women reported receiving breast examination instructions (Kosecoff, et al., 1985). Even a survey of the attitudes of residents, faculty and fellows found that less than half thought preventive health services should be provided in the teaching hospital to continuing-care patients (Earp, et al., 1984).

Professional Training in Support of National Health Initiatives

National health care issues of highest priority to the Department include appropriate responses to (1) the disease of alcoholism; (2) the escalating cost of health care; (3) the complex needs of the geriatric population; (4) the general need for disease prevention and health promotion efforts; and (5) the unmet needs for nutritional care (USDHHS, 1979). These areas have merited special attention, but have long been neglected in the traditional training of providers (U.S. Senate, 1980); therefore, the Federal Government has initiated several curriculum activities which include the initiatives discussed below.

Alcoholism. Family medicine units have developed and integrated programs on the prevention, recognition, and treatment of alcohol abuse and alcoholism; 29 schools initiated programs that provided training to students who are now practicing. Additionally, the Society of Teachers of Family Medicine (STFM) developed a BHPr-cosponsored *Family Medicine Curriculum Guide to Substance Abuse* (STFM, 1982). To date, all of the 384 allopathic residency programs and the 128 osteopathic postgraduate training programs have used this guide.

Little attention had been given to development of educational resources that address the unique problems of detection and treatment of teenagers. The

Department of Family Medicine at Ohio State University (OSU) has initiated a BHPr-sponsored study to develop teenage alcoholism modules.

Cost Containment. Although current emphasis in the Medicare program is to reduce the cost of hospital services, less attention has been paid to the potential for physicians to reduce the cost of patient care. A review of numerous cost containment efforts reported that physicians often are unaware of the economic impact of their medical decisions. Further, cost containment education has the potential to result in physicians practicing more efficiently (USGAO, 1983).

Ninety (77 percent) of the medical schools responding to the General Accounting Office questionnaire said that they were providing cost containment training, and that 9,930 (68 percent) of their 1981 graduates had received the training, compared to about 8,400 in 1979. Of the residency programs responding, 55 percent said they were providing training. However, 59 percent of the schools teaching cost containment did so using an unstructured program. Moreover, 65 percent of the student respondents to the 1981 AAMC annual questionnaire considered the amount of cost containment training inadequate.

Southern Illinois University, with BHPr support, is developing and promoting educational modules to modify the behavior of students, family medicine residents, and family practitioners to incorporate cost containment strategies. These modules will consist primarily of opportunities to apply systematic cost containment assessments to their provisison of care.

Faced with poor student performance on the financing questions of a community health clerkship final examination, one department of family medicine designed a simulation game, "Coverage." The game was an effective and enjoyable means of teaching students the intricacies of health insurance and increased student sensitivity to costs (MacLeod and Smith, 1984).

Geriatrics. Because of a rapidly growing aged population that tends to need and use medical services disproportionately when compared to the entire population, the need for appropriately trained health professionals is also growing. Present education in geriatric concerns is not adequate. Because most elderly persons seek care from physicians trained in general/family practice, internal medicine, and psychiatry, it is essential that residency programs in these specialties incorporate geriatric experiences (USDHHS, Feb. 1984).

In recent years, the BHPr, National Institute on Aging, Administration on Aging, National Institute on Mental Health and the Veterans Administration, as well as organizations in the private sector, have sponsored programs designed to improve and expand coverage of geriatrics in medical education programs (USDHHS, Feb. 1984).

Preventive Medicine. Although a balance or oversupply of physicians is anticipated in most specialties, preventive medicine is one of few projected to be in shortage in 1990 (USDHHS, Apr. 1981). Enrollment in preventive medicine residency programs totaled 309 residents in 1981, with a slight increase to 343 in 1982 and 349 in 1983 (AMA, 1984c). However, progress reports from the 20 residency training programs receiving Federal support reflected an increase of about 48 percent in enrollment between the academic years 1982-83 (the year before implementation of the grant program) and 1984-85. Data from the applications indicated that 129 residents were enrolled in the 20 programs in 1982-83 compared to 190 in 1984-85. Also, the grantees collectively indicated that a large number of qualified applicants were denied admission because of inadequate financial resources.

Other significant activities designed to address training in preventive medicine include the University of Arizona, Health Sciences Center, BHPr-sponsored effort to develop a model joint family medicine-preventive/community medicine clerkship. A 4-week block clerkship is to be developed and pilot-tested, with guidelines to facilitate implementation in other schools. A specific recommendation in a private sector report led to development of this model (STFM/ATPM, 1983).

Nutrition. With BHPr support, the Department of Family Medicine of OSU is producing educational packages, a faculty handbook, and an implementation plan focused on nutritional health promotion and disease prevention. Earlier, OSU produced 16 study packages with focusing on nutritional care of individual health problems; more than 12,000 of these BHPr-supported pieces have been sold.

Medical Credentialing

Medical credentialing is a complex arena of processes and decisions which yield evidence of physicians' competency to provide care and determine when and where they may practice, their qualifications for specialization and their right to continue to hold a medical license. It involves U.S. citizens educated and practicing in the U.S., foreign national foreign medical graduates, and U.S. citizens who have studied medicine abroad and return as USFMGs, with both latter groups seeking further education and/or to practice in the U.S. Such credentialing includes accreditation of approximately 6,000 allopathic and osteopathic undergraduate and residency programs, as well as continuing medical education programs as another area essential to assurance of competency.

Another major aspect of credentialing is licensing, which is the prerogative of each State. The State Medical Board's authority includes taking appropriate disciplinary action, from probation to revocation of licenses. Credentialing also includes board certification in more than 70 specialties and subspecialties recognized by the American Board of Medical Specialties. Multiple private sector organizations are involved, not only in the areas of their own credentialing responsibility, but also in relating to other such groups. Psychometrics and laws are among the myriad additional components of credentialing.

The Federal Government does not accredit programs or license or certify physicians. The BHPr is the Federal focal point for medical credentialing activities and supports private sector efforts to assure physician competency. Through its contacts and contracts, the BHPr promotes (1) equity in credentialing evaluation for all who seek licensure, including FMGs; (2) single nationwide credentialing standards; (3) state-of-the-art evaluation of competency; and (4) resolution of nationwide credentialing problems.

National Board of Medical Examiners (NBME). Physicians earn their U.S. licenses by passing one of the examinations prepared by the NBME, a nonprofit agency which prepares and administers examinations possessing sufficient validity and reliability to permit State agencies to license without further analysis of competency. Under BHPr support, the NBME developed advanced evaluation instruments to assess physician competency to provide unsupervised care. One major accomplishment is the NBME's computer-based examination (CBX), a uniquely unstructured, uncued simulation of practice that allows a physician both to conduct a diagnostic workup and institute treatment over time, while the computer maintains a complete record. NBME is seeking support to implement the CBX in 20-25 secure examination centers nationwide.

Federation of State Medical Boards (FSMB). The FSMB's membership includes all medical boards of the States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, and 10 Canadian provinces. The Federation's licensing examination (FLEX), developed by the FSMB and NBME, is used by all States, and by some of the above jurisdictions, as the examination to assess physician competency. Recently the FSMB, with NBME, replaced the single FLEX with a stronger New FLEX Program with two examinations, one to assess competency to provide supervised care as a resident, and another to provide independent care as a practitioner. To facilitate a smooth transition to the New FLEX Program, the FSMB established a BHPr-supported task force to complete an in-depth education of State medical boards and other appropriate entities about the new program.

FSMB has initiated a computer data production and reporting system on medical licensure which includes all disciplinary actions by all licensing jurisdictions and Federal Medicare/Medicaid sanctions. A BHPr-sponsored FSMB project facilitates enhancement of the system, which among other things, will print rapidly a sequential profile of disciplinary actions on physicians. The project provides for the design of a program to enhance and expand State-acquired information for the use of all medical licensing jurisdictions and appropriate others such as the Office of the Inspector General (OIG), Department of Health and Human Services (DHHS).

In order to eliminate fraud and abuse in the Medicare/Medicaid program, the OIG, DHHS, is required to exclude such culpable practitioners from the program. The role of the Federal Government in acquiring and using the necessary State disciplinary data is being deliberated to assure that it does not usurp the States' prerogative to control the practice of its physicians.

Educational Commission for Foreign Medical Graduates (ECFMG). The ECFMG assesses and then certifies the readiness of FMGs to enter accredited U.S. residency or fellowship programs. To obtain occupational and non-preference visas to enter the U.S. to practice or enter GME, certain FNFMGs are required under public law to pass the NBME Part I and II examinations, or an examination determined to be equivalent by the Secretary, DHHS.

Until 1983, the Visa Qualifying Examination (VQE) was determined by the BHPr for the Secretary to be equivalent for the purpose of this requirement. In 1983, the Secretary, DHHS, on the recommendation of the BHPr, determined that the Foreign Medical Graduate Education in the Medical Sciences (FMGEMS) was equivalent to the NBME Part I and Part II examinations. The FMGEMS, designed cooperatively by NBME and ECFMG, replaced both the VQE for certain FNFMGs and the ECFMG medicine examination for the remaining FNFMGs and all USFMGs. The new 2-day examination, introduced in July 1984, was designed to contribute to equity in evaluation because the pass rate on the ECFMG examination was higher than the VQE.

National Board of Examiners for Osteopathic Physicians and Surgeons (NBEOPS). In 18 States the osteopathic medical profession has its own licensing boards, whereas in the remaining States, the medical boards address both allopathic and osteopathic licensing. The NBEOPS and the American Osteopathic Association have conducted BHPr-supported projects to (1) assess credentialing needs, (2) conduct an educational program on criterion-referenced examinations for members of the NBEOPS, and (3) initiate a computer program for examination analysis.

Cooperative Ventures. In recognition of the NBEOPS' concerns, a number of BHPr-stimulated interactions between the osteopathic and allopathic credentialing bodies have ensued, including the first joint meeting of the NBME and the NBEOPS, which led to an expansion of the interaction by members of these groups. Currently, the FSMB computer disciplinary data system covers all allopathic and some osteopathic licensees; and discussion is underway between these two disciplines to expand the system to include all osteopathic physicians.

Physicians sanctioned for fraudulent practice are distinct from persons who are not physicians but possess fraudulent credentials and attempt to practice. It is difficult to estimate the number in the latter group. The FSMB and the BHPr are among the cadre of private and Federal entities meeting under the aegis of the OIG, DHHS, to assess this problem and plan its resolution.

Accreditation Groups. The Liaison Committee on Medical Education, the Accreditation Council for Graduate Medical Education, and the Accreditation Council for Continuing Medical Education play essential roles in assuring that education leads to competency. The BHPr has provided fiscal and staff support to assist these groups in a variety of activities.

A Look at the Future

This section presents the latest forecasts of allopathic and osteopathic physician supply and requirements for 1990 and 2000. It provides supply estimates for USMGs, USFMGs, and FNFMGs, and for specialties and States. An explanation of the changes in the assumptions and methods from those previously reported, is also presented. The "basic" forecasts incorporated the most likely assumptions, while "high" and "low" estimates provide a range. The section also reviews the precision of forecasting. It also presents a discussion of the supply/demand forecasting model and an analyses of the impact of an expanded supply. Finally, this section presents physician requirements estimates and matches aggregate supply with requirements.

Physician Supply Forecasts: Assumptions

This section highlights changes in the assumptions that produced new forecasts from those previously reported (USDHHS, 1984a; USDHHS, Mar. 1985c).

U.S. Trained Physicians. From the evidence presented in earlier sections on enrollments and applicants, and other indicators, the most likely future trend in U.S. medical school first-year enrollments in the near term is downward.

The basic forecasting assumption is that first-year enrollments in allopathic medical schools will decline by 5 percent between 1984 and 1989. This assumption was made previously; however, the actual numbers of enrollments in 1984 proved to be lower than earlier estimates so the new projected numbers of first-year enrollments are somewhat lower (Table 3-41).

From the most likely or basic set of forecasts, some indication of reasonable variation can be made. A "low" alternative series for first-year enrollments in allopathic medical school projects a 10 percent decline between 1984 and 1989. The "high" alternative series uses first year class sizes projected to 1988-89 by the medical schools. After an allowance is made for those students who repeat the first year, the school projections are slightly higher than if enrollments were maintained at present levels.

There is no apparent similar downward trend in the first-year class sizes of osteopathic medical schools. However, as previously cited, the schools expect to stabilize their enrollment at about 1,700 freshmen during the next few years. This forecast of stabilization was used for the basic series of projections for osteopathic physician supply.

The "low" alternate series of estimates for osteopathic graduates assumes a one-percent per year decrease in first-year class size between 1984 and 1989, similar to the decrease observed between 1982 and 1983. The "high" alternate series assumes that at least one-half the increase in first-year class size between 1979 and 1983 will continue through 1985, and then stabilize at 1,760 new enrollees per year throughout the projection period.

Foreign Trained Physicians. There are four components to the FMG physician supply: permanent immigrants, exchange visitors who temporarily enter the U.S. for training (J-Visa foreign nationals), H-Visa foreign nationals, restricted to physicians of distinguished merit and ability, and USFMGs. Projections of new entrant FMGs in all categories except for H-Visa foreign nationals are derived from estimates of pass rates on qualifying examinations, and are limited by the number of PGY-1 accredited GME positions historically filled by FMGs. There is no other current reliable information on the number of FMG new entrants. Therefore, the number of FMGs in their PGY-1 in 1984 was assumed to be the total number of FMG new entrants in 1984. This assumption may have underestimated the actual number of FMG new entrants, particularly for those who may have entered residency training later than the first year of a program or those who may have bypassed residency training altogether. The current basic projections, however, are very close to previous projections of FMGs that used a different approach and different source data (USDHHS, 1981).

As previously cited, 1,831 USFMGs were in their first postgraduate year of residency training in 1984. Future new entrant USFMGs are expected to number about 1,900 annually based on the assumption that a similar percentage will pass the FMGEMS as passed the ECFMG qualifying examination. Although the FMGEMS is considered a more difficult examination, it can not be taken until the applicant has completed all basic medical training and is within one year of completing the clinical sciences training. Thus, the average pass rates likely will not be lowered by those who may have taken the prior ECFMG examination for practice, and failed because of inadequate preparation.

The number of FNFMG immigrants has been declining in recent years. U.S. Immigration and Naturalization Service (INS) data show a decrease of about

65 percent in permanent resident visas between 1972 and 1979, the last year for which verifiable INS data are available. Preliminary 1984 data from the INS support a continued slight decline. Between 1981 and 1984, the total number of FNFMGs in residency training decreased by 18 percent, although the number of FNFMGs in PGY-1 has remained relatively constant at 1,176 in 1983 and 1984 (AMA, 1985b). There are no corresponding data for earlier years.

FNFMGs who enter permanently through occupational, non- and family preference visas are projected to number 676 of the 1,176 each year between 1984 and 2000. This forecast assumes that FNFMGs will pass the FMGEMS at about the same rate as those who took the VQE . Since 1980, about 20 percent of FNFMG examinees have passed the VQE each year, with little variation. The first FMGEMS results reported that 17.4 percent of FNFMGs who took the FMGEMS passed both parts. Although, as discussed below, there is reason to think that FMGEMS test results may deteriorate somewhat from results on the VQE, the basic assumption was made that the pass rate will continue to be close to 20 percent.

The number of FMG exchange visitors, as previously stated, has sharply declined in the past decade. More recently, the number of FMGs entering the U.S. on exchange visitor visas for residency training seems to have stabilized at about 500 per year. There is a much larger number of J-Visa FMGs who enter the country each year for participation in programs of research, consultation and observation. An estimated 2,000 FMGs enter each year for such reasons. There are no data available regarding how many of this latter group eventually become U.S. citizens and licensed physicians, or in other ways may be counted by the AMA as an active physician. The forecasts include only J-Visa FMGs who are entering their first post-graduate year of residency training and make no allowance for FMGs who enter U.S. medical practice through other routes.

About 500 J-Visa physician exchange visitors are expected to enter the country each year in the projection period (the remaining 500 of the 1,176). Exchange visitors, however, by law are allowed up to 7 years to complete their residency training, then must return to their home country. It is generally held that most exchange visitors indeed do return; however, some do remain in or return to the U.S. In both cases, firm estimates are not available.

H-Visa FMG entries, a category restricted to physicians of distinguished merit and ability, are estimated based on past trends to number 180 new entrants each year, and are assumed to remain at this number throughout the projection period.

Alternative series of estimates were made for FMGs as a function of variations in FMGEMS pass rates and constraints in availability of residency positions. The lower range of estimates assumes that the percentage of FNFMG examinees passing both parts of the FMGEMS will decrease by 10 percent below the average pass rate on the VQE, because the FMGEMS is said to be a more rigorous, difficult examination. The low series average pass rate on the FMGEMS is assumed to be about 17 percent, which is very close to the actual rate reported on the first FMGEMS. The low series also assumes that a 5 percent decline will occur in the numbers of residency positions available to foreign nationals.

The high alternate series assumes an average pass rate of 30 percent, which approaches the pass rate of USFMGs on the ECFMG examination. No expansion in number of available residency positions is assumed to occur.

The low series of estimates for USFMGs project that their FMGEMS pass rate will decline from an average of 34 percent who passed the ECFMG examination between 1981 and 1983, to a 25 percent average pass rate on the FMGEMS. First results for USFMGs taking the FMGEMS report a dramatic decline in the pass rate. The high series supposes that USFMGs will be motivated to boost their test scores in response to stiff competition for one of a declining number of residency training vacancies. In the high series, 40 percent of USFMG examinees are assumed to pass both parts of the FMGEMS.

Physician Supply Forecasts: Method

The supply forecasts are produced by the BHPr physician supply forecasting model. This model in its simplest form, augments the active supply or stock of physicians in the base year (1981) with annual new entrants and subtracts annual losses due to deaths and retirements (i.e., flow)

Since the last report (USDHHS, May 1984), the model has been refined to enable projections of physicians by medical specialty and geographic location. These methods and procedures are necessarily complex (USDHHS, Mar. 1985).

Physician Supply Forecasts by Specialty. In a brief description, however, the model forecasts a distribution of physicians disaggregated by year of graduation from medical school (or equivalently by their PGY-1), gender, and country of medical education for each year in the projection period. The distribution of these disaggregated totals into specialty categories depends upon the PGY of the physician.

In the early PGYs, the specialty distribution changes over time largely due to the movements from general specialties to subspecialties. In the later PGYs, there are only minor shifts in the specialty distribution of a given graduating class, stabilizing at various PGYs depending on the specialty. When physicians reach the stabilization PGY in a given specialty the percentage in that specialty is assumed to remain constant thereafter. The stabilization period in the model varies from one to ten years. Thus, since the model's base period is 1981, for those physicians who entered GME prior to 1972 there will be no projected changes in the specialty distributions throughout the projection period, and therefore distributed according to their specialty distribution as reported in the 1981 data.

Those physicians who entered GME after 1972 and whose particular stabilization PGY has been exceeded, are distributed according to their specialty distribution in the previous year, the year of their stabilization. For the remaining physicians, the observed 1981 percentage distribution for their given PGY is used to distribute them into specialties. Thus, the specialty percentages projected for PGYs up to and including the stabilization PGY are simply the observed 1981 percentages. Beyond the stabilization PGY the percentages of the stabilization PGY are carried foreward so that the class shows no change. The methodology assumes that newly-trained physicians will tend to enter practice in the various specialties in roughly the same proportion as these groups have in recent years. The projected specialty distribution of the overall supply of physicians changes over time because of the differences between the specialty distributions of the new entrants and those of the older cohorts that they are replacing.

Physician Projections by State. The forecasts of physicians by year of graduation, gender, country of medical education and year of projection are distributed across States according to their 1981 distributions for each of the first ten PGYs. For physicians who are in their tenth or later PGY, no further shifts across States are assumed. Projections of physicians by specialty by State have not been made.

Separations from Active Supply. The mortality and retirement rates age- and gender-specific and based on the experiences of MDs. The retirement rates were developed from distributions of inactive physicians between 1967 and 1974. These rates are currently being updated.

The differences in work patterns of males and females have been decreasing in recent years, and it is likely that the 1967-74 experience does not accurately represent the current workforce participation of women physicians. While changes in the retirement rates for women affect the projected supply levels, such differences are probably not large enough to significantly affect the projected total estimates of physicians. Mortality rates are physician-specific and were developed from AMA data for the years 1969-73. These rates, too, are being updated.

Physician Supply Forecasts: Results

In the basic series of estimates, the supply of active physicians (MDs and DOs) is projected to reach 696,600 by 2000, an increase of 229,600 or 49 percent more than the active supply in 1981 (Table 3-42). In the alternative estimates, the total supply of physicians is projected to range from 675,000 to 722,400 physicians in 2000, a difference of about 7 percent (Tables 3-43 and 3-44). In 1990, the number of active physicians is expected to be 587,700 in the basic series with estimates ranging from 583,000 to 593,700 in the alternative series.

The supply of allopathic physicians (MDs) is projected to increase from 449,000 in 1981 to 656,100 MDs in 2000, within a range of 635,400 to 681,300. Osteopathic physicians (DOs) are projected to grow from 18,000 in 1981 to 40,400 DOs by 2000 with estimates ranging from 39,400 to 41,100.

The supply of physicians is expected to expand between 1981 and 2000 at a substantially higher rate than population will grow during this period. The physician:population ratio is projected to be 260 physicians per 100,000 persons in 2000 (basic series), a 28 percent increase from 1981 (Table 3-42).

The largest portion of the projected growth in physician supply is attributable to increases in graduates from U.S. medical and osteopathic schools (Table 3-41). Projected numbers of U.S. trained MDs in the basic series account for about 79 percent of the growth in the overall supply between 1981 and 2000, with growth in numbers of foreign-trained physicians making up 11 percent of the total and increases in osteopathic physicians accounting for the remaining 10 percent. These proportions of growth are about the same between 1981 and 1990.

A net gain of about 24,500 foreign-trained physicians is expected between 1981 and 2000 according to the basic series, largely based on assumed reduction in numbers of U.S. citizen foreign medical graduates, and foreign national foreign medical graduates entering U.S. practice through occupational and family preference and non-preference visa opportunities.

Considering the restrictive nature of legislation affecting FMGs and the diversity of other influences, the FMG supply is projected to increase more slowly than in earlier years and at a substantially slower rate than the supply of U.S.-trained physicians. Net increases in the number of FMGs are expected to average about 1,300 per year between 1981 and 2000 and the total number of FMGs in U.S. practice is forecast to be about 113,300 by 1990, and reach 123,200 by 2000 (basic series) (Table 3-42). The estimates range from 110,600 to 139,800 by 2000 (Tables 3-43 and 3-44). FMGs will comprise about 18 percent of the total supply in 2000 compared to about 21 percent in 1981.

Although a number of Canadian medical graduates (CMGs) enter the U.S. each year, their additions historically have been offset by death, retirement and emigration from the CMG supply. Little change in the number of Canadian-trained physicians has occurred in recent years and no change from an estimated supply of 7,000 in 1981 is projected (Table 3-42).

Women physicians accounted for only about 12 percent of all physicians in 1981 and have increased their proportion over earlier years, but recent major increases in first-year enrollments of women in schools of allopathic and osteopathic medicine indicate that their numbers will increase substantially in the future. Women are expected to make up almost 17 percent of the 1990 physician supply, and number 98,200 physicians from a base of 55,800 in 1981. By 2000, women are expected to represent 21 percent of the physician supply and approach 144,000 in number (Table 3-45). To the extent that the working life patterns and specialty and location choices of women physicians differ from males, the characteristics of physician supply in future years may similarly differ from the present.

A difference of about 7 percent between the alternative estimates demonstrates the relative insensitivity of the total supply to even sharp changes in future U.S. medical school enrollments. Between the mid-1960's and the present time, enrollments in medical schools more than doubled, reflecting the extensive growth in the supply of physicians. Much of the future supply of physicians is already in place or in training. Even assuming substantial decreases in medical school enrollments and future FMG entrants, the supply of physicians will increase by more than 25 percent by 1990. The base of active physicians is now sufficiently large that if enrollments were to decline by as much as 10 percent over the next 5 years the total supply in 1990 would be little affected.

To illustrate, there is only 0.3 percent difference between the low and high series in the numbers of U.S.-trained physicians for 1990 even though the high series assumes no reduction in enrollments contrasted with the 10 percent reduction in the low series. By 2000 this difference is about 3 percent, still only modest reduction in the total supply. There is practically no difference in 1990 between the basic and low series, and by 2000 the difference is still less than 2 percent.

Specialty Projections. Between 1981 and 2000, the numbers of MDs are projected to increase in nearly all specialties (Table 3-46). The largest increases are projected for the secondary medical specialties--those medical specialties other than primary care--37 percent by 1990, and 74 percent by 2000. The primary care specialties, including obstetrics/gynecology, are projected to increase 28 percent between 1981 and 1990, and 53 percent by 2000. The smallest increase is projected for the surgical specialties--19 percent between 1981 and 1990, and 34 percent by 2000. The "other" specialties, including mainly anesthesiology, radiology, psychiatry, pathology and neurology, are forecast to grow 22 percent between 1981 and 1990, and 42 percent by 2000.

Of the 82,020 MDs reported to be in internal medicine in 1981, about 16,100 are considered subspecialists by AMA in a more detailed classification. When these subspecialists are excluded, the number of primary care MDs, including obstetrician/gynecologists, increases 27 percent between 1981 and 1990, and 51 percent between 1981 and 2000. Thus, the internal medicine subspecialties are forecast to grow at about the same rate as general internal medicine.

On the other hand, the internal medicine subspecialties of gastroenterology, cardiology and pulmonary diseases, forecast separately, are projected to grow significantly, with gastroenterology displaying the greatest growth of any specialty over the two decades, increasing 56 percent between 1981 and 1990, and 114 percent between 1981 and 2000. These latter three subspecialties are anticipated to grow substantially in coming years, partly in response to an aging population with an increasing number of illnesses requiring their services (USDHHS, Mar. 1985).

Large increases are also projected for diagnostic radiology, which is expected to grow by 54 percent between 1981 and 2000. However, general radiology, whose residency program recently has been converted to diagnostic and therapeutic radiology, is forecast separately. Because these estimates do not account for the proportions of general radiology residents in GME who elected diagnostic or therapeutic radiology before the conversion, the forecasts of the individual radiology specialties must be used with some caution. The total supply of radiologists is expected to grow 24 percent between 1981 and 1990, and 42 percent by 2000.

A few specialties are forecast to decline in number, such as forensic pathology and public health, anticipated to decrease by 40 to 50 percent between 1981 and 2000, while the number of allergists is forecast to change very little throughout the projection period, declining in number but by less than 1 percent.

State Projections. The projections of MDs by State are based upon the geographical patterns in 1981. Thus, they do not account for changing conditions that could affect future MD location and relocation patterns. Between 1981 and 1990, the Nation is forecast to experience a 25 percent increase in MDs, but there is considerable variation among Regions and States. MD supply in the Western Region is expected to grow the most--31 percent by 1990, and double that amount by 2000. The smallest change is anticipated in the Middle Atlantic Region whose supply is forecast to grow 19 percent by 1990 and 35 percent between 1981 and 2000 (Table 3-47).

The smallest growth among States is expected in Michigan where the supply is forecast to increase 15 percent between 1981 and 1990, and 10 percent more by 2000, while the greatest increase is expected in Alaska, about 66 percent between 1981 and 1990, and 141 percent between 1981 and 2000 (Table 3-47).

When growth in population is taken into account, these patterns change somewhat. The greatest predicted gain in the physicians:population ratio is anticipated for the Northeast--22 percent between 1981 and 1990, and nearly as much for the Middle Atlantic Region. Even though the Middle Atlantic States are expected to experience the smallest increase in numbers of MDs, their population is expected to grow at an even slower rate, producing the higher than average ratio (Table 3-48).

Conversely, the Western Region, which is forecast to experience the greatest numeric increase in supply in the 1980's, also is anticipated to experience large increases in population and thereby a relatively small gain in physician:population ratio--10 percent between 1981 and 1990. Only the West South Central Region is forecast to realize a smaller increase--9 percent during this period. This latter Region is slightly above the national average in its expected numeric increases in MDs in the 1980's.

The largest and smallest State/area changes are expected in the District of Columbia (57 percent), and in Florida (-9 percent), between 1981 and 1990, respectively. Both of these locales are in the South which is forecast to experience relatively small overall growth. In the Northeast, which shows the highest physician:population ratio growth among Regions, New Hampshire will experience just a 5 percent increase between between 1981 and 1990, while Massachusetts is projected to increase its rate by 32 percent. Massachusetts, with 279 physicians per 100,000 population in 1981, is second only to Maryland with a ratio of 313 among States in physician:population ratio. Massachusetts is forecast to have the largest ratio of any State in 2000, with 463 physicians per 100,000 population. Idaho, with 114 physicians per 100,000 population, had the lowest ratio in 1981. Wyoming, with a declining ratio because the overall population is growing at a much faster rate than its MD supply, will probably have the smallest physician:population ratio in 1990 (119) and in 2000 (111).

It should be noted that because relatively small changes in the growth rate of either the numerator of denominator in the physician:population ratio can produce sharp differences in the ratios after several years, ratio comparisons may be difficult to interpret. Population and physician projections used in this report were independently developed, the former by the Bureau of the Census and the latter by the Bureau of Health Professions. A projection methodology that explicitly links the physician projections to population projections would minimize this problem (USDHHS, Mar. 1985).

Physician Requirements Forecasts: Method

Estimates of physician requirements based on projected service demand were made using the BHPr general requirements model which employs an adjusted utilization approach (USDHHS, Jan. 1982). This approach assumes that recent patterns of service utilization and productivity will continue. Current utilization levels are adjusted by projected changes in population, trends in health insurance benefits and other factors affecting utilization, such as changes in prices of services and summary determinants not directly measured by consumer prices.

The previously reported values for these price and nonprice determinants (USDHHS, May 1984) have since been refined and updated. HCFA has completed a major revision of its annual estimates of health insurance benefits paid since 1968 in order to adequately count benefits paid by certain firms and organizations. The net effect of this revision is to substantially increase the role of insurance in the physician services sector during the 1970's. Thus, some of the BHPr-projected growth in requirements attributable to insurance coverage growth had already occurred, and projections for 1990 and 2000 are now slightly lower.

Physicians Requirements Forecasts: Matching Requirements with Supply

The BHPr model projects requirements for 541,000 physicians in 1990 and for 618,800 physicians in 2000, or a 19-percent increase over the period 1985-2000. In both 1990 and 2000, the supply of physicians, according to the basic series of estimates, is projected to be greater than requirements. For 1990, an excess of 46,600 is projected, and increases to 77,800 in 2000. The excesses represent about 8 and 11 percent of the supply in those respective years.

Comparison of Supply and Requirements for Physicians (MDs and DOs):
1981 Supply and Projections to 1990 and 2000
(in thousands)

1981	1990		2000		Percent Increase 1981-2000	
Supply	Supply	Requirements	Supply	Requirements	Supply	Requirements
467.0	587.7	541.0	696.6	618.8	49	33

SOURCE: Health Resources and Services Administration, Bureau of Health Professions. Supply forecasts are from the BHPr Supply Model basic series of estimates; requirements estimates are from the BHPr General Requirements Model.

A different approach to projecting supply and requirements, undertaken by the Graduate Medical Education National Advisory Committee (GMENAC), was also previously reported, along with more current requirements revisions (USDHHS, May 1984). The revisions as reported produced 1990 supply projections in excess of requirements by 63,000, and by about 137,000 in 2000. Recently revised supply projections for 1990, based upon the GMENAC approach and incorporating latest available data, produced slightly lower supply estimates, further reducing the projected gap between supply and requirements to about 55,000 physicians (Cultice, 1985).

According to these results, the U.S. had about as many physicians in practice in 1985 as was projected to be required in 1990. That is, the estimated physician supply in 1985 of about 473,000 matches the revised requirements figure for 1990. Thus, according to GMENAC criteria, even though the population will be larger and older in 1990, the supply of physicians will continue to increase as will the surplus.

However, according to a recent analysis conducted to assess the impact of alternative assumptions about future physician productivity on the GMENAC supply forecasts, the forecasted gap between supply and requirements in 1990 could shrink by as much as 82 percent or increase by as much as 10 percent (Rudzinski, 1985).

Another projection of physician requirements is provided by the Bureau of Labor Statistics (BLS). Its model projects the employment growth in the U.S. economy over the period 1984-1995, and much greater relative growth in the health care sector. However, the growth rate of employment in the hospital industry is now projected to be much less than previously reported. Consequently, the next set of BLS physician requirements projections will show a significant decrease from the 34-percent increase in physicians required over the period 1982-1995. However, these new figures will still be substantially higher than the 11-percent growth in physician requirements projected by the BHPr model over the period 1985-1995.

Projecting physician requirements is a difficult undertaking when such substantial changes are occurring in the health care industry. Continued expansion is anticipated in the overall U.S. economy throughout the remainder of this century, and the demand for health care services is likely to remain strong. However, significant changes are occurring in components of the health care sector. Although some of the short-term effects have already been felt, there is uncertainty as to the industry's ultimate structure when these changes come to fruition.

Some of the consequences of the increased supply of physicians on utilization have already been felt and were discussed earlier (e.g., reduction in office and hospital visits). However, the net long-term impact is difficult to assess. How much of this recent decline is a long-term trend or a one-time adjustment? As additional years of hospital data become available, this issue will be clarified.

The second and related major consideration is the impact of recent organizational developments, especially the rapid growth of HMOs, on the output of physician services. HMOs are characterized by lower ratios of physician staffing to enrolled population and greater use of primary care physicians and mid-level personnel. However, the reasons why HMOs appear to be different from the rest of the medical care system are not clearly understood. Consequently, it is difficult to draw conclusions about the impact of the further growth of HMOs and other related organizations on physician requirements.

Historical Precision of Supply Forecasting. Validating the precision of forecasting requires a standard for comparison. BHPr physician supply forecasting relies upon published AMA data. Because the base from which these estimates are driven is constantly updated from special tabulations provided by the AMA, the estimates can be validated only in the short-run period between updates.

Often aggregate estimates are on target, but their components vary from published figures. For example, 1972 projections of the physician supply for 1975 and 1980 were very close to published figures. However, overestimates of FMGs were balanced by underestimates of DOs and USMGs (BHPr, 1982). Similarly, in another short-term validation, aggregate estimates were nearly identical to actual figures, but mismatching by specialty did occur (USDHHS, 1980a).

The base year estimates currently used in the BHPr model have been updated periodically from 1972 to 1976 to 1978 and finally to 1981. For the last period, aggregate FMG forecasts continually understated AMA published figures. Apparently, FMGs enter the pipeline by means that are not clearly identified for incorporation into forecasting procedures but find their way into the published counts.

On the other hand, published FMG figures seem to vary from year to year in an unexplainable erratic fashion, clouding the validation process. When the functional form of existing time series data is identified, interpolating and extrapolating are facilitated (USDHHS, Jan. 1981). For physician supply data, growth is nearly linear, limiting real year-to-year variation. Thus, erratic changes in published figures are a function of data collection limitations. In sum, although component estimates may vary, long-term forecasting at the aggregate level may be more precise.

Supply/Demand Forecasting Model

Competition is an important force in the Nation's health care industry, resulting from changes in statutory and regulatory policies and the increased supply of physicians (Hixson, 1984). Structured changes in the reimbursement and payment methods, such as the Medicare PP/DRG and proposed physician payment systems, would be expected to generate long-term changes in the payment system, and in particular would affect hospitals. Also, changes in Medicare and Medicaid reimbursement policies such as the inclusion of end-stage renal disease or liver transplants and payments for radiology, pathology and anesthesiology services--can produce long-term changes that would affect specific patient and provider groups, as well as costs. Changes in insurance coverage and other third-party reimbursements resulting from alterations in the tax (not health care) system also would contribute. The net effect has been to foster a more competitive health care market.

Conventionally, the adequacy of physician supply is determined by comparing estimates of supply with requirements and is expressed in terms of shortages and surpluses, as just discussed. Alternatively, the BHPr developed, and the University of Michigan modified a time-series multiequation simultaneous model that uses conventional supply and demand analysis, and focuses on the interrelatedness of the principal factors. As an example, the model may emphasize that the impact of the increasing stock of physicians on each particular variable of interest cannot be assessed independent of the impacts on all the other variables. Assumptions are specifically stated; large numbers of simultaneous interactions may be modeled with potential for developing alternative policy scenarios; results are subjected to tests of validity; forecasts are developed on the basis of alternative policies and economic conditions simultaneously.

The model is based upon eight equations, each modeling: (1) supply of physician services; (2) supply of hospital services; (3) demand for private hospital insurance; (4) demand for private physician insurance; (5) total expenditures for Government-funded hospital services; (6) total expenditures for Government-funded physician services; (7) demand functions for out-of-pocket or direct expenditures for hospital services; and (8) demand functions for out-of-pocket or direct expenditures for physician services.
The equilibrium values were computed for 1953 through 1981, and for the forecasted period, 1982 through 1984. This approach is being used to assess the impact of an increased supply of physicians, but is not forecasting on a subnational level.

Based upon analogous responses to competitive pressures in other industries, the researchers were able to speculate changes in the manner in which physician services are likely to be delivered:

1. Movement toward greater specialization by some specialties and subspecialties, and greater generalization by others, which would lead to increased economic efficiency.

2. Specialists' differentiation of their services by a variety of promotional activities at both public and professional levels.

3. Changes in practice organization, specifically, growth of single-specialty and large multispecialty organizations, in location, and in service marketing to access new potential patients.

4. Horizontal practice and service integration (e.g., expansion of for-profit hospitals, satellite operations, group practices) and vertical integration (e.g., bids from hospital chains to purchase pharmaceutical chains, and hospitals opening physicians' offices, nursing homes, and free-standing psychiatric centers).

5. Growth in the number of free-standing facilities, including centers for birthing, diagnosis, occupational health, primary care, surgery, urgent care, and wellness.

6. Increasing difficulty of entry into practice (particularly for USFMGs), bleaker economic prospects, especially as medicine becomes more capital-intensive moreso for solo practice. The factors may spawn a wide range of organizational arrangements.

Competition among physicians will lead to an expansion in the types and levels of services rendered for the spectrum of patient problems. The actual difference in behavior over time will be less influenced by specialties, either complementing or competing, than by the intensity of competition in specific market areas. As competition intensifies, popular practice locations will become "overdoctored" economically, and newly trained physicians will seek better economic opportunities in less well-served areas.

The actual case mix specialists treat may also change. Major urban centers with high densities of specialists may find physicians actually treating a wide variety of cases. Over time, new physicians may be expected to be trained in more than one specialty, and new programs may be designed to assimilate the prospective physician.

These modifications are not all predicted to occur rapidly or smoothly, or without intense debate within the profession. As the industry changes in response to the increased supply, statutory and regulatory policies and competition, in turn, are predicted to have substantial influence on the supply of physicians and medical specialties (Policy Analysis, Inc., 1983).

Summary and Conclusions

The supply of allopathic physicians continued to grow between 1980 and 1983, but at a slightly slower pace than observed in the 1970's. Also, the 1980-1983 supply growth outpaced the growth of the resident population at about the same average annual rate that it did between 1975 and 1980.

As of 1982, 42 percent of MDs were under the age of 40, and 40 percent had graduated since 1970, reflecting a steadily growing youthful MD supply. Also, more than half were board certified.

Internal medicine still heads the list as the most popular specialty. The remaining primary care specialties of general/family practice and pediatrics ranked second and fourth, respectively, with general surgery ranked third. Of particular note is the continual decline in the percentage of general/family practitioners. This decline, coupled with the moderated growth in internal medicine and pediatrics, has produced a relatively constant primary care specialty representation for more than a decade. When the relevant subspecialties are subtracted from internal medicine and pediatrics, the primary care percentage for 1982 barely exceeded 30.

Although younger MDs tend to favor the primary care specialties--41 percent compared with 34.6 percent for all MDs--a disproportionate number were still in their early years of training, leaving their ultimate specialty choices for future examination. Younger MDs also registered significant growth in office-based practice and research. It remains to be seen whether an increasing younger MD supply will generate continued growth in these practice activities.

FMGs maintained their approximate 21-percent representation and remained more than twice as likely to be in hospital-based practice as their USMG or CMG counterparts. This representation in hospital-based practice has remained constant since 1970. FMG representation in GME dropped significantly between 1970 and 1980 but grew between 1980 and 1983, whereas FMG representation on hospital staffs displayed the opposite trends during the same periods.

Internal medicine continued to be the most popular FMG specialty. The number of FMGs in general/family practice, the second most popular, declined between 1970 and 1980 as did those in overall general/family practice, but this pattern reversed by 1982. FMGs continued to account for one-third of all MDs in anesthesiology and therapeutic radiology and nearly one-half of those in physical medicine and rehabilitation.

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FMGs continued to represent about one-third or more of all MDs in the States of Delaware, Illinois, New Jersey, New York, and West Virginia. In 1983, Florida, Maine, Maryland and New Jersey granted more than 50 percent of their medical licenses to FMGs. USFMGs represented 12.0 percent of all active FMGs, up slightly from 11.2 percent in 1979. Since 1979, USFMGs were distributed more evenly across the specialties, most notably increasing their representation in general/family practice from 10.4 to 15.6 percent, ranking second only to internal medicine.

Since 1980, the pool of female MDs grew by 27.9 percent compared to 11.1 percent for all MDs. The average annual growth in women MDs was approximately the same as observed in the latter half of the 1970's. Their specialty distribution has converged somewhat with that of male MDs, both showing a preference for internal medicine. Limited data on minority MDs revealed that as of 1980, only 11 percent of all MDs were not white. Minority women represented nearly three times more of the percentage of all minority MDs than did non-minority women. Finally, a recent examination of data on black physicians revealed that they are significantly more primary-care-oriented than all MDs.

Between 1982 and 1983 the number of office and hospital MD visits dropped for the first time. The net income of general/family practitioners continued to decline, whereas the largest net income increase was registered among surgeons (10 percent). The overall medical care services component of the CPI grew at a faster rate in 1984 than all CPI items.

Although access to care has improved, 24 percent of the poor still reported access problems, as did 6.2 percent of the elderly, 15 percent of blacks, and 11.5 percent of Hispanics.

The health care delivery strategies of the 1980's have inculcated cost containment. These strategies have directed attention to the survival of primary care services.

Little change has occurred in the geographic distribution of MDs. The gap between the percent of MDs in urban and rural areas has remained about the same since 1970. There is evidence, however, that the increased supply of physicians has affected the location decisions of young physicians. A larger proportion of young physicians locate outside of highly populated counties, and general/family practitioners moreso than for internists and pediatricians. Yet, the total number of graduates establishing practice in rural areas between 1974 and 1978 was comparatively small.

The changes in population growth and various economic factors in certain rural and urban poverty areas remain unfavorable for the establishment of practice. The increased supply of physicians will improve access for certain areas, but others will continue to need public assistance.

AHECs have focused on professional training as the vehicle for improving access. Many formerly federally-supported programs are now securing local financial support. The NHSC has located new practitioners in shortage areas, which have decreased in number since 1983; however, about 14 million people remain in underserved HMSAs.

The number of Doctors of Osteopathy continues to grow at the same pace observed in the latter half of the 1970's and predominantly in the primary care specialties. DOs also remain concentrated in a few States: 11 out of the 16 States with the most DOs experienced growth rates greater than average; however, Michigan, ranked first, continued its decline in growth.

The supply of physicians is growing in other developed nations as well. Some of these countries are instituting policies to restrict residency specialty training slots and limiting entry into medical schools. In the U.S., the undergraduate and graduate medical education environments have responded to the expanded physician supply and escalating health care costs. School development has declined, as have first-year enrollments for the first time in 37 years. The four minority-owned institutions have experienced financial stress as sources of revenues shift to patient care. Faculty continued to increase in number, however, producing an increase in the faculty/student ratio.

The perceived physician surplus, along with rising tuitions, also may have contributed to a declining applicant pool. A slight decrease in academic ability has been predicted to accompany further declines in the pool, but should not markedly affect the overall quality of students. Academic reasons for withdrawal may increase, although overall withdrawal rates are not expected to shift.

Rising tuition and indebtedness may have reversed the 1970's trend of a decline in family income of students. Financial assistance declined then increased in 1983-84. Moreover, scholarship recipients tend to have greater debts at graduation than nonrecipients. Federal scholarship recipients are the exceptions, (State and other scholarship sources do not completely meet the needs of their recipients). Scholarship recipients from under-represented minority members had the lowest mean debt among all aid recipients.

Women's representation in allopathic schools continues to grow reaching nearly 34 percent of new enrollees in 1984-85, up from 31 percent in 1982-83 and 14 percent in 1972-73. Underrepresented minorities have not faired so well. They continue to have lower acceptance rates, GPAs and MCAT scores, and higher attrition and repeater rates. The HCOP-supported schools did have some impact on withdrawal and graduation rates, but institutional commitment was a significant intervening factor. With the exception of American Indians, the largest percentage of accepted applicants among under-represented minorities came from the lowest parental income category.

Applicants to schools of osteopathy increased, but not as fast as first-year positions, which rose 6 percent in 1982. For the first time, female applicants rose above 1,000, representing 27 percent of all applicants. Minority applicants also rose, to 13 percent of all applicants.

In 1984-85, nearly 43 percent of all residents were in internal medicine, family practice and pediatrics. Among PGY-1 residents, 57 percent were in these programs. However, more than half of recent IM residents entered sub-specialty training. Although this rate is lower than the 80 percent rate of the early 1970's, internal medicine programs also play a role in the general education of MDs who ultimately specialize in other fields.

More than 25 percent of residents are women; black residents whose undergraduate training was from a LCME-accredited school represented about 5 percent of all LCME undergraduate-trained residents. Black, female and total specialty preferences are similar. Resident salaries have moderated, not keeping pace with inflation. Nevertheless, residents' problems center on their educational experience and workload, reflecting a willingness to accept personal hardships as the price for attaining educational goals.

The number of GME applicants substantially exceeded the number of available positions. USMGs continue to match at a rate that exceeds 90 percent, whereas FMG match rates, (either FNFMG or USFMG) continue to decline. Although the percentage of FMG residents continued its small but steady decline, the percentage of USFMGs who constitute the majority of FMG residents--continued to increase substantially. However, this USFMG percentage has leveled since 1983.

If the number of available positions does not increase as fast as the number of FMG applicants, the pool of FMGs with neither residency training nor licenses to practice is also likely to increase. Since the mid-1970's, the number of temporary visitors sponsored for GME by the ECFMG plummeted. This reduction has raised concern about the declining U.S. role in international medical education exchange.

The financing of medical education continues to challenge hospitals and insurance carriers who are faced with a proposed sharp reduction in Federal support for GME and greater private insistence that price be the determinant of consumption. Much of the debate centers around high-cost teaching hospitals where faculty and facilities are used for both undergraduate and graduate training. Reliance upon revenues from patient care has risen substantially in recent years, while Federal support has declined. In particular, primary care departments do not generate enough income to cover costs, and they must be subsidized by the institution. As competition intensifies, primary care programs are potentially at risk.

The pre-occupation with the impact of increased physician supply on distributions and costs has stimulated renewed concern about its effects on quality of care. In addition to skills, a renewed emphasis on values and attitudes in the general professional education of physicians is needed.

To bolster quality assurance standards, the Federal Government has supported undergraduate and graduate training programs in the primary care specialties. This support has produced more primary care practitioners, faculty and departments. Several studies are underway to assess the impact of these initiatives more rigorously. The Federal Government has also supported curricula development in concert with national health objectives such as health promotion and disease prevention, geriatrics, cost containment, nutrition and preventive medicine.

The credentialing of physicians is designed to assure competency. The various organizations in the private sector responsible for setting standards have joined with BHPr to promote equity in credentialing and state-of-the-art competency evaluation.

Physician (MD and DO) supply is projected to increase to nearly 700,000 by the year 2000, or about 49 percent. Alternative "low" and "high" projections indicate a range of about 5 percent. This supply is expected to expand at a substantially faster rate than the population, with a physician:population ratio in 1981 of 202.4, increasing to 259.9 by the end of the century.

Women are expected to make up almost 17 percent of the active physician supply in 1990, a number close to 100,000, up from a level of 55,800 in 1981. By the year 2000, women are expected to compose 20.6 percent of supply and number 143,500.

The growth in active MD supply is expected to vary by specialty group. Total growth is anticipated to be outpaced slightly by the growth in primary care specialties, and considerably by that in other medical specialties. Rates of growth in the surgical and other specialties will not keep pace with the total. Although the aggregate forecasts approximate physician supply with estimates of population requirements for services, some specialties such as preventive medicine and psychiatry are projected to experience shortfalls.

The growth in supply will vary only slightly across regions and States, reducing the number of shortage areas in some States, while leaving others with areas that remain underserved. Only growth in the West and in New England is anticipated to exceed the average.

Increased supply will foster increased competition which will in turn stimulate specialization by some generalists and generalization by some specialists. Single specialty and large multi-specialty organizations will emerge with increased efficiency as their main goal. Free-standing facilities will proliferate, and the case mix treated by specialists will change.

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Table 3-1. The Supply of Physicians (MDs) in the U.S., 1963 - 1982

	Aggregate supply as of December 31				
	1963	1973	1978	1981	1982
Total Physicians	276,475 a/	366,379	437,486	485,123	501,958
U.S. Graduates	238,571	288,719	339,114	374,581	387,083
Foreign Graduates	36,569	77,660	98,372	110,542	114,875
Canadian	5,644	6,325	7,021	7,780	7,591
Other	30,925	71,335	91,351	102,762	107,284
Percent FMGs	13.2	21.2	22.5	22.8	22.9
Physicians per 100,000 Population					
Total	146	174	196	210	217
USMGs	126	137	152	162	167
FMGs	19	37	44	48	50
Total U.S. Population (in thousands)	189,242	210,908	223,400	230,500	231,800

	Average Annual Increases							
	1963-1973		1973-1978		1978-1982		1963-1982	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Physicians	8,990	3.3	14,221	3.9	16,118	3.7	11,868	4.3
U.S. Graduates	5,015	2.1	10,079	3.5	11,922	3.5	7,816	3.3
Foreign Graduates	4,109	11.2	4,142	5.3	4,126	4.2	4,121	11.3
Canadian	68	1.2	139	2.2	143	2.0	102	1.8
Other	4,041	13.1	4,003	5.6	3,983	4.4	4,019	13.0
Total U.S. Population (in thousands)	2,167	1.1	2,498	1.2	2,100	0.9	2,240	1.2

a/ Includes 1,335 physicians, addresses unknown, who are not distributed according to sources of medical education.

SOURCES: American Medical Association. Distribution of Physicians in the U.S., 1973. Chicago, 1974; American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1978. Chicago, 1979; American Medical Association. Data Sheet on Physicians, and Physician Characteristics and Distribution, 1981. Excerpts from the AMA Physician Masterfile. Chicago, January, 1983; American Medical Association. Physician Characteristics and Distribution in the U.S., 1983. Chicago, 1984; Population estimates were provided by the U.S. Department of Commerce, Bureau of the Census.

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Table 3-2. Number and Percent Distribution of Professionally Active MDs in Primary Care, and Rate Per 100,000 Population, 1970-1982

Category	1970	1975	1980	1981	1982
			Number of MDs		
Professionally Active a/	310,845	340,280	414,916	430,745	449,389
Primary Care, Total b/	117,761	130,634	159,922	163,383	173,734
General Practice c/	57,948	54,557	60,049	60,594	62,339
Internal Medicine	41,872	54,331	71,531	75,211	79,980
Pediatrics	17,941	21,746	28,342	29,578	31,415
All other	193,084	209,646	254,994	267,362	275,655
			Percent Distribution		
Professionally Active a/	100.0	100.0	100.0	100.0	100.0
Primary care: total b/	37.9	38.4	38.5	38.4	38.7
General Practice c/	18.6	16.0	14.5	14.1	13.9
Internal Medicine	13.5	16.0	17.2	17.5	17.8
Pediatrics	5.8	6.4	6.8	6.9	7.0
All Other	62.1	61.6	61.5	61.6	61.3
			Rate per 100,000 Population		
Professionally Active a/	149	155	179	185	191
Primary Care: total b/	57	60	69	70	74
General Practice c/	28	25	26	26	26
Internal Medicine	20	25	31	32	34
Pediatrics	9	10	12	13	13
All Other	93	96	110	115	117
Population (in thousands) d/	208,066	219,272	231,266	233,459	235,691
Population 14 Years and Under (in thousands) e/	57,881	53,648	51,290	51,264	51,387
Pediatrics Rate for Age 14 Years and Under f/	30	40	57	58	61

a/ Excludes inactive, not classified and address unknown categories.

b/ In its publication of 1981 data, the AMA began differentiating additional subspecialists in internal medicine and pediatrics, which are included under general internal medicine and pediatrics in this table. Separate estimates in internal medicine are provided for allergy and immunology, diabetes, endocrinology, geriatrics, hematology, immunology, infectious diseases, neoplastic diseases, nephrology, nutrition, oncology and rheumatology. Separate estimates in pediatrics were provided for adolescent medicine, neonatal-perinatal medicine, pediatrics-endocrinology, pediatrics hematology/oncology, and pediatrics-nephrology. When these groups are excluded from the 1982 internal medicine and pediatric data in this table, the respective estimates for internal medicine and pediatrics become 64,151 and 29,687. Thus, these specialties decrease from 17.8 percent and 7.0 percent to 14.3 percent and 6.6 percent respectively of all active physicians.

c/ Includes MDs in Family Practice, 1970-1981.

d/ U.S. Census estimates are as of July 1 for each year and include U.S. residents, armed forces overseas and the civilian population in U.S. possessions.

e/ As of July 1 of each year, but estimates exclude the civilian population of Puerto Rico and outlying areas, for whom age-specific data are not available.

f/ Pediatrics rate calculation excludes data for practitioners and population of Puerto Rico and outlying areas.

SOURCES: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983. Chicago, 1984. Also previous annual additions for 1970, 1975, 1980 and 1981 data; U.S. Department of Commerce, Bureau of the Census, Current Population Reports Series P-25, Nos. 951, 943-944 and previous issues.

Table 3-3. Number of Active Physicians (MDs) and Physician-to-Population Ratios, by General and Specialty Practice: Selected Years, December 31, 1970-1982 a,b,c/

Type of Practice	1970		1975		1980		1981		1982	
	Number	Physicians per 100,000 Population	Number	Physicians per 100,000 Population	Number	Physicians per 100,000 Population	Number	Physicians per 100,000 Population	Number	Physicians per 100,000 Population
Estimated Active d/	314,196	150.0	370,395	169.0	440,357	190.4	448,660	192.2	465,026	197.3
Professionally Active e/	310,845	149.4	340,280	155.2	414,916	179.4	430,745	184.5	449,309	190.7
General and Family Practice	57,948	27.8	54,557	24.9	60,049	26.0	60,594	26.0	62,339	26.4
Medical Specialties	77,214	37.[illegible]	95,087	43.4	125,755	54.4	132,031	56.6	140,103	59.4
Allergy	1,719	0.8	1,716	0.8	1,518	0.7	1,527	0.7	1,525	0.6
Cardiovascular Diseases	6,476	3.1	6,933	3.2	9,823	4.2	10,370	4.4	10,934	4.6
Dermatology	4,003	1.9	4,661	2.1	5,660	2.4	5,825	2.5	6,066	2.6
Gastroenterology	2,010	1.0	2,381	1.1	4,046	1.7	4,464	1.9	4,729	2.0
Internal Medicine	41,872	20.1	54,331	24.8	71,531	30.9	75,211	32.2	79,980	33.9
Pediatric Allergy	391	0.2	446	0.2	461	0.2	398	0.2	421	0.2
Pediatric Cardiology	487	0.2	530	0.2	655	0.3	704	0.3	734	0.3
Pediatrics	17,941	8.6	21,746	9.9	28,342	12.3	29,570	12.7	31,415	13.3
Pulmonary Diseases	2,315	1.1	2,335	1.1	3,715	1.6	3,946	1.7	4,299	1.8
Surgical Specialties	86,042	41.3	96,015	43.8	110,770	47.9	113,704	48.7	118,709	50.4
General Surgery	29,761	14.3	31,562	14.4	34,034	14.7	34,651	14.8	35,775	15.2
Neurological Surgery	2,578	1.2	2,926	1.3	3,341	1.4	3,498	1.5	3,726	1.6
Obstetrics and Gynecology	18,876	9.1	21,731	9.9	26,305	11.4	27,200	11.7	28,383	12.0
Ophthalmology	9,927	4.8	11,129	5.1	12,974	5.6	13,281	5.7	13,841	5.9
Orthopedic Surgery	9,620	4.6	11,379	5.2	13,996	6.1	14,572	6.2	15,571	6.6
Otorhinolaryngology	5,409	2.6	5,745	2.6	6,553	2.8	6,529	2.8	6,873	2.9
Plastic Surgery	1,600	0.8	2,236	1.0	2,980	1.3	3,265	1.4	3,482	1.5
Colon and Rectal Surgery	667	0.3	661	0.3	719	0.3	754	0.3	762	0.3
Thoracic Surgery	1,809	0.9	1,979	0.9	2,133	0.9	2,085	0.9	2,140	0.9
Urology	5,795	2.8	6,667	3.0	7,743	3.3	7,889	3.4	8,236	3.5
Other Specialties	89,641	43.1	94,621	43.2	118,334	51.2	124,416	53.3	128,158	54.4
Aerospace Medicine	1,188	0.6	684	0.3	587	0.3	629	0.3	634	0.3
Anesthesiology	10,860	5.2	12,861	5.9	15,958	6.9	16,845	7.2	18,794	8.0
Child Psychiatry	2,090	1.0	2,581	1.2	3,271	1.4	3,295	1.4	3,468	1.5
Neurology	3,074	1.5	4,131	1.9	5,685	2.5	6,226	2.7	6,675	2.8
Occupational Medicine	2,713	1.3	2,355	1.1	2,358	1.0	2,623	1.1	2,507	1.1
Pathology f/	10,483	5.0	11,910	5.4	13,642	5.9	14,128	6.1	14,796	6.3
Physical Medicine and Rehabilitation	1,479	0.7	1,664	0.8	2,146	0.9	2,355	1.0	2,685	1.1
Psychiatry	21,146	10.2	23,922	11.0	27,481	11.9	28,524	12.2	29,674	12.6
Public Health g/	3,833	1.8	3,454	1.6	3,126	1.4	2,924	1.3	2,968	1.3
Radiology h/	13,360	6.4	16,240	7.4	20,282	8.8	21,283	9.1	22,883	9.7
Other and Unspecified	19,415	9.3	14,819	6.8	23,798	10.3	25,584	11.0	23,074	9.8

a/ Includes physicians in Federal service; also includes physicians in U.S. possessions.

b/ Ratios are based on total population plus civilian population in U.S. possessions. Ratios in this table may differ slightly from those in previous tables due to rounding based on calculating total category ratios in terms of the sum of individual specialties within each major grouping.

c/ In its publication of 1981 data, the AMA began differentiating additional subspecialists in internal medicine, pediatrics and general surgery. Separate estimates were made available for internal medicine subspecialties of allergy and immunology, diabetes, endocrinology, geriatrics, hematology, immunology, infectious diseases, neoplastic diseases, nephrology, nutrition, oncology and rheumatology. Separate estimates in pediatrics were provided for the subspecialties of adolescent medicine, neonatal-perinatal medicine, pediatrics-endocrinology, pediatrics hematology/oncology, and pediatrics-nephrology. Separate estimates for surgical subspecialties were also made available for abdominal surgery, cardiovascular surgery, hand surgery, head and neck surgery, pediatric surgery and traumatic surgery. In this table, these subspecialties were formerly included in AMA published data under interna' medicine, pediatrics and general surgery. When excluded from these categories, the total number of internists, pediatricians and general surgeons presented for 1982 decrease to 64,151, 29,687 and 32,135, respectively.

d/ These numbers of active physicians are adjusted by distributing the not classified and unknown address categories according to the distribution of the known responses of active and inactive physicians.

e/ Excludes inactive, not classified and address unknown categories.

f/ Includes forensic pathology.

g/ Includes general preventive medicine.

h/ Includes both diagnostic and therapeutic radiology.

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Table 3-4. Number of Federal and Non-Federal Physicians (MDs only) in the United States and Possessions by Detailed Specialty, December 31, 1981 and 1982[a]

	1981	1982
Total Physicians	485,123	501,958
General Practice	60,594	62,339
Family Practice (FP)	31,195	33,831
General Practice (GP)	29,399	28,508
Medical Specialties	132,031	140,103
Allergy (A)	1,527	1,525
Cardiovascular Diseases (CD)	10,378	10,934
Dermatology (D)	5,825	6,066
Gastroenterology (GE)	4,464	4,729
Internal Medicine	75,211	79,980
Allergy and Immunology (AI)	846	850
Diabetes (DIA)	408	417
Endocrinology (END)	2,023	2,093
Geriatrics (GER)	697	714
Hematology (HEM)	1,963	2,076
Infectious Diseases (ID)	1,565	1,672
Immunology (IG)	358	359
Internal Medicine (IM)	60,118	64,151
Neoplastic Diseases (ND)	659	657
Nephrology (NEP)	2,438	2,558
Nutrition (NTR)	171	182
Oncology (ON)	2,167	2,334
Rheumatology (RHU)	1,798	1,917
Pediatrics	29,578	31,415
Adolescent Medicine (ADL)	249	278
Neonatal-Perinatal Medicine (NPM)	865	990
Pediatrics (PD)	28,027	29,687
Pediatrics, Endocrinology (PDE)	125	135
Pediatrics, Hematology-Oncology (PHO)	236	248
Pediatrics, Nephrology (PNP)	76	77
Pediatric Allergy (PDA)	398	421
Pediatric Cardiology (PDC)	704	734
Pulmonary Diseases	3,946	4,299
Broncho-Esophagology (BE)	12	12
Pulmonary Diseases (PUD)	3,934	4,287
Surgical Specialties	113,704	118,789
General Surgery	34,651	35,775
Abdominal Surgery (ABS)	377	373
Cardiovascular Surgery (CDS)	1,751	1,963
General Surgery (GS)	31,308	32,135
Head and Neck Surgery (HNS)	206	221
Hand Surgery (HS)	481	517
Pediatric Surgery (PDS)	402	436
Traumatic Surgery (TRS)	126	130
Neurological Surgery (NS)	3,498	3,726
Obstetrics and Gynecology	27,200	28,383
Gynecology (GYN)	1,761	1,759
Obstetrics (OBS)	205	215
Obstetrics and Gynecology (OBG)	25,234	26,409
Ophthalmology (OPH)	13,281	13,841
Orthopedic Surgery (ORS)	14,572	15,571

Table 3-4. Number of Federal and Non-Federal Physicians (MDs only) in the United States and Possessions by Detailed Specialty, December 31, 1981 and 1982[a]
(Continued)

	1981	1982
Otorhinolaryngology	6,529	6,873
Laryngology (LAR)	9	9
Otology (OT)	106	110
Otorhinolaryngology (OTO)	6,403	6,742
Rhinology (RHI)	11	12
Plastic Surgery	3,245	3,482
Maxillofacial Surgery (MFS)	52	60
Plastic Surgery (PS)	3,193	3,422
Colon and Rectal Surgery (CRS)	754	762
Thoracic Surgery (TS)	2,085	2,140
Urology (U)	7,889	8,236
Other Specialties	124,416	128,158
Aerospace Medicine (AM)	629	634
Anesthesiology (AN)	16,845	18,794
Child Psychiatry (CHP)	3,295	3,468
Diagnostic Radiology (DR)	8,647	10,732
Forensic Pathology (FOP)	273	283
Neurology	6,226	6,675
Child Neurology (CHN)	416	425
Neurology (N)	5,810	6,250
Occupational Medicine (OM)	2,623	2,587
Psychiatry	28,524	29,674
Hypnosis (HYP)	59	53
Psychiatry (P)	27,303	28,467
Psychoanalysis (PYA)	1,003	992
Psychosomatic Medicine (PYM)	159	162
Pathology	13,855	14,513
Blood banking (BLB)	195	202
Clinical Pathology (CLP)	896	921
Dermatopathology (DMP)	86	90
Neuropathology (NA)	176	176
Pathology (PTH)	12,502	13,124
Radioisotopic Pathology (RIP)	---	---
Physical Medicine and Rehabilitation (PM)	2,355	2,685
General Preventive Medicine (GPM)	809	839
Public Health (PH)	2,115	2,129
Radiology	10,892	12,071
Nuclear Medicine (NM)	1,156	1,142
Nuclear Radiology (NR)	33	42
Pediatric Radiology (PDR)	201	215
Radiology (R)	9,502	8,777
Therapeutic Radiology (TR)	1,744	1,895
Other	14,102	14,772
Emergency Medicine (EM)	7,811	8,472
Clinical Pharmacology (PA)	505	511
Legal Medicine (LM)	131	131
Other Specialty (OS)	5,655	5,658
Unspecified (US)	11,482	8,302
Not Classified	14,154	13,558
Inactive	35,011	35,690
Address Unknown	5,213	3,321

[a] Using specialty codes of the American Medical Association.

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1982 and 1983 editions. Chicago, 1983 and 1984.

Table 3-5. Major Professional Activity of Federal and Non-Federal Physicians, (MDs): Selected Years, 1970-1982

Activity	1970	1975	1980	1981	1982	Percent Change 1970-1982
Total Physicians	334,028	393,742	467,679	485,123	501,958	50.3
Patient Care	278,535	311,937	376,512	389,369	408,663	46.7
Office-Based	192,439	215,429	272.000	288,038	299,191	49.7
Hospital-Based	86,096	96,508	104,512	101,331	109,472	17.7
Residents	51,228	57,802	62,042	63,349	68,986	23.7
Staff	34,868	38,706	42,470	37,982	40,486	8.9
Non-Patient Care	32,310	28,343	38,404	41,376	40,726	28.1
Medical Teaching	5,588	6,445	7,942	7,202	7,505	28.9
Administration	12,158	11,161	12,209	13,250	13,408	9.0
Research	11,929	7,944	15,377	17,901	16,743	50.1
Other	2,635	2,793	2,876	3,023	3,070	14.7
Not Classified or Address Unknown	3,562	32,013	27,019	19,367	16,879	43.7
Inactive	19,621	21,449	25,744	35,011	35,690	78.4

Percent Distribution

Activity	1970	1975	1980	1981	1982
Total Physicians	100.0	100.0	100.0	100.0	100.0
Patient Care	83.4	79.2	80.5	80.3	81.4
Office-Based	57.6	54.7	58.2	57.7	59.6
Hospital-Based	25.8	24.5	22.3	20.9	21.8
Residents	15.3	14.7	13.3	13.1	13.7
Staff	10.4	9.8	9.1	7.8	8.1
Non-Patient Care	9.7	7.2	8.2	8.5	8.1
Medical Teaching	1.7	1.6	1.7	1.5	1.5
Administration	3.6	2.8	2.6	2.7	2.7
Research	3.6	2.0	3.3	3.7	3.3
Other	0.8	0.7	0.6	0.6	0.6
Not Classified or Address Unknown	1.1	8.1	5.8	4.0	3.4
Inactive	5.9	5.4	5.5	7.2	7.1

SOURCES: American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1968-1982 editions, and Physician Characteristics and Distribution in the U.S., 1982-1983 editions. Chicago. Data are as of December 31 of each year.

Table 3-6. Initial Licensure of Physicians (MDs) Each Year in the U.S., 1950-1983

Year	Total New Licentiates	U.S. and Canadian Graduates	FMGs (Other Than Canadian Graduates)	
			Number	Percent
1950	6,002	5,694	308	5.1
1951	6,273	5,923	350	5.6
1952	6,885	6,316	569	8.3
1953	7,276	6,591	685	9.4
1954	7,917	7,145	722	9.8
1955	7,737	6,830	907	11.7
1956	7,463	6,611	852	11.4
1957	7,455	6,441	1,014	13.6
1958	7,809	6,643	1,166	14.9
1959	8,269	6,643	1,626	19.7
1960	8,030	6,611	1,419	17.7
1961	8,023	6,443	1,580	19.7
1962	8,005	6,648	1,357	17.0
1963	8,283	6,832	1,451	17.5
1964	7,911	6,605	1,306	16.5
1965	9,147	7,619	1,528	16.7
1966	8,851	7,217	1,634	18.5
1967	9,424	7,343	2,081	22.1
1968	9,766	7,581	2,185	22.4
1969	9,978	7,671	2,307	23.1
1970	11,032	8,016	3,016	27.3
1971	12,257	7,943	4,314	35.2
1972	14,476	7,815	6,661	46.0
1973	16,689	9,270	7,419	44.5
1974	16,706	10,093	6,613	39.6
1975	16,859	10,894	5,965	35.4
1976	17,724	11,288	6,436	36.3
1977	18,175	12,324	5,851	32.2
1978	19,393	14,815	4,578	23.6
1979	19,896	16,330	3,566	17.9
1980	18,172	14,862	3,310	18.2
1981	18,831	15,700	3,131	16.6
1982	17,605	13,409	4,196	23.8
1983	20,601	15,848	4,753	23.1
Total	412,329	304,014	94,906	23.0
Averages				
1950-1954	6,871	6,334	537	7.8
1955-1959	7,747	6,634	1,113	14.4
1960-1964	8,050	6,628	1,423	17.7
1965-1969	9,433	7,486	1,947	20.6
1970-1974	14,232	8,627	5,605	39.4
1975-1979	18,409	13,130	5,279	28.7
1980-1983	18,802	14,955	3,848	20.4

SOURCE: American Medical Association. U.S. Medical Licensure Statistics, 1983, and Licensure Requirements, 1984. Chicago, 1985.

Table 3-7. Federal and Non-Federal Physicians (MDs) by Specialty and Gender, 1975 and 1982

	1975			1980			1982			Change 1975 - 1982
Women Specialty	Number	Percent of Women Physicians	Percent of All Physicians	Number	Percent of Women Physicians	Percent of All Physicians	Number	Percent of Women Physicians	Percent of All Physicians	Percent of Women Physicians
Total Physicians	35,636	100.0	9.1	54,284	100.0	11.6	64,247	100.0	13.1	80.3
General Practice	2,866	8.0	5.3	4,677	8.6	7.8	6,067	9.4	9.9	111.7
Internal Medicine a/	4,006	11.2	7.4	8,130	14.9	11.4	10,832	16.9	13.5	170.4
Surgery	1,196	3.4	1.6	2,318	4.3	2.7	3,061	4.8	3.3	155.9
Pediatrics b/	5,081	14.3	24.5	8,117	15.0	28.5	9,976	15.5	31.8	96.3
Ob-Gyn	1,777	5.0	8.2	3,243	6.0	12.3	4,207	6.5	14.8	136.7
Radiology	1,006	2.8	6.2	1,742	3.2	8.6	2,250	3.5	9.9	123.7
Psychiatry c/	3,803	10.7	14.3	5,257	9.7	17.1	6,454	10.0	19.5	69.7
Anesthesiology	1,819	5.1	14.2	2,388	4.4	15.0	3,077.	4.8	16.4	69.2
Other	5,674	15.9	13.8	8,834	16.3	13.8	10,341	16.1	15.1	82.3
Other Unspecified d/	8,408	23.6	15.7	9,578	17.6	11.5	7,982	12.4	15.2	5.1

	1975			1980			1982			Change 1975 - 1982
Men Specialty	Number	Percent of Men Physicians	Percent of All Physicians	Number	Percent of Men Physicians	Percent of All Physicians	Number	Percent of Men Physicians	Percent of All Physicians	Percent of Men Physicians
Total Physicians	358,106	100.0	90.0	413,395	100.0	88.4	425,777	100.0	86.9	18.9
General Practice	51,691	14.4	94.7	55,372	13.4	92.2	55,171	13.0	90.1	6.7
Internal Medicine a/	50,325	14.1	92.6	63,401	15.3	88.6	69,148	16.2	86.5	37.4
Surgery	73,088	20.4	98.4	82,155	19.9	97.3	90,274	21.2	96.7	23.5
Pediatrics b/	15,681	3.9	75.5	20,359	4.9	71.2	21,439	5.0	68.2	36.7
Ob-Gyn	19,954	5.6	91.8	23,062	5.6	87.7	24,176	5.7	85.2	21.2
Radiology c/	15,234	4.3	93.8	18,540	4.5	91.4	20,553	4.8	90.1	34.9
Psychiatry	22,700	6.3	85.7	25,495	6.2	82.9	26,688	6.3	80.5	17.6
Anesthesiology	11,042	3.1	85.8	13,570	3.3	85.0	15,717	3.7	83.6	42.3
Other	53,336	14.9	96.2	68,256	16.5	86.2	58,024	13.6	84.9	8.8
Other Unspecified d/	45,054	12.6	84.3	43,185	10.5	88.5	44,587	10.5	84.8	0.0

a/ Includes the specialties of allergy, cardiovascular diseases, gastroenterology, and pulmonary diseases.
b/ Excludes the subspecialties of pediatric allergy and pediatric cardiology.
c/ Includes general and child psychiatry.
d/ Includes inactive, unclassified and address unknown categories.

SOURCE: Compiled by Health Resources and Services Administration, Bureau of Health Professions, Division of Medicine, based on data from the American Medical Association. Physician Distribution and Medical Licensure in the U.S., 1976 and Physician Characteristics and Distribution in the U.S., 1981 and 1983 editions. Chicago, 1977, 1981 and 1984.

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Table 3-8. Federal and Non-Federal Women Physicians (MDs) by Activity, 1970 and 1982

Activity	1970			1982			Annual Percent Change 1970-1982	
		Women			Women			
	Total	Number	Percent	Total	Number	Percent	Total	Women
Total Physicians	334,028	25,401	7.6	501,958	64,247	12.8	4.2	12.7
Patient Care	278,535	18,362	6.6	408,663	50,762	12.4	3.9	14.7
Office-Based	192,439	9,217	4.8	299,191	27,269	9.1	4.6	16.3
Hospital-Based	86,096	9,145	10.6	109,472	23,493	21.5	2.3	13.1
Residents	51,228	5,464	10.7	68,986	16,518	23.9	2.9	16.9
Full-Time Staff	34,868	3,681	10.6	40,486	6,975	17.2	1.3	7.5
Other Professional Activities	32,310	2,956	9.1	40,726	5,503	13.5	2.2	7.2
Medical Teaching	5,588	611	10.9	7,505	1,164	15.5	2.9	7.5
Administration	12,158	915	7.5	13,408	1,390	10.4	0.9	4.3
Research	11,929	1,146	9.6	16,743	2,433	14.5	3.4	9.4
Other	2,635	284	10.8	3,070	516	16.8	1.4	6.8
Not Classified, Inactive, Address Unknown	22,825	4,014	17.6	52,569	7,982	15.2	10.9	8.2

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S.,1983. Chicago, 1984.

Table 3-9. National Health Care Expenditures by Purpose
1976, 1981-1983 actual, 1984-85 estimate, Average Annual Rate of Increase,
1976-1981 and Yearly Percent Change 1981-82 to 1984-85
(billions of $)

	1976	1981	1982	1983	1984	1985
Total	150.8	285.8	322.3	355.4	384.3	422.6
	actual				estimate	
Purpose						
Physician Services	27.6	54.8	61.8	69.0	75.2	82.4
Hospital Care	60.9	117.9	134.9	147.2	155.6	173.0
All Other	62.3	113.1	125.6	139.2	153.5	167.2

	Average Annual Rate of Increase	Percent Change			
	1976-81	1981-82	1982-83	1983-84	1984-85
Total	13.6	12.8	10.3	8.1	10.1
Purpose					
Physician Services	14.7	12.8	11.7	9.0	9.6
Hospital Care	14.1	14.4	9.1	5.7	11.2
All Other	12.7	11.1	10.8	10.3	8.9

SOURCES: Health Care Financing Administration. Health Care Financing Review 6:2, Winter 1984, and telephone communication with HCFA staff.

Table 3-10. Consumer Price Indexes, 1976, 1981 and 1983

	1976	1981	1983	Average Annual Rate of Increase 1976-81	Average Annual Rate of Increase 1981-83
Consumer Price Index a/	170.5	272.4	298.4	9.8	4.6
Medical Price Index	184.7	294.5	357.3	9.8	4.0
Physician services	188.5	299.0	352.3	9.7	3.8
Hospital Room	268.6	481.1	619.7	12.4	5.2

a/ Urban consumers, Total; 1976 = 100.

SOURCE: Telephone communication with Health Care Financing Administration staff, February 1985.

Table 3-11. Distribution of the Population and Location of MDs by Census Division, 1982 a/

Census Division	Civilian Population (in thousands)		Federal and Non-Federal MDs		Total MDs per 100,000 Population	Non-Federal MDs		Primary Care Non-Federal MDs Excluding OBG		Primary Care Non-Federal MDs Including OBG	
	Number	Percent	Number	Percent		Number	Percent	Number	Percent	Number	Percent
New England	12,493	5.4	34,327	7.0	277	33,577	7.1	9,960	6.6	11,519	6.5
Middle Atlantic	36,963	16.0	95,741	19.4	260	94,241	19.9	29,618	19.5	34,723	19.5
East North Central	41,585	18.0	77,085	15.7	186	75,664	20.0	25,740	17.0	30,031	16.9
West North Central	17,342	7.5	31,110	6.3	180	30,306	6.4	11,029	7.3	12,470	7.0
South Atlantic	38,213	16.5	82,585	16.8	219	77,021	16.2	23,199	15.3	27,886	15.7
East South Central	14,812	6.4	22,869	4.6	155	22,007	4.6	7,644	5.0	8,980	5.0
West South Central	25,111	10.8	42,228	8.6	169	39,950	8.4	12,953	8.5	15,407	8.7
Mountain	11,967	5.2	23,245	4.7	194	21,955	4.6	6,939	4.6	8,159	4.6
Pacific	33,049	14.3	83,304	16.9	255	79,680	16.8	24,729	16.3	28,895	16.2
Total	231,534	100.0	492,494b/	100.0	213	474,401c/	100.0	151,811	100.0	178,070	100.0

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a/ Columns may not add to total because of rounding.

b/ Excludes 4,906 Federal and non-Federal MDs in the possessions, 1,237 APO's and FPO's, and 3,321 MDs with unknown addresses.

c/ Excludes 4,756 non-Federal MDs in the possessions.

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983 edition. Chicago, 1984.

Table 3-12. Number of Non-Federal Physicians and Physicians per 100,000 Civilian Population, by States a/

	1982 Civilian Population		1982 Total Non-Federal		Non-Federal Physician per 100,000 Civilian Population							Rank by Physician: Population Ratio 1982	
	(in thousands)	Percent	Physicians	Percent	1980	1980-1981 Percent Change	1981	1981-1982 Percent Change	1982	1980-1982 Percent Change	Patient Care 1982	Total	Patient Care
Total U.S.	230,116	100.0	474,401b/	100.0	195	2.6	200	3.0	206	5.6	169	--	--
State													
Alabama	3,917	1.7	5,436	1.1	130	3.1	134	3.7	139	6.9	120	45	43
Alaska	421	0.2	563	0.1	134	-2.2	131	2.3	134	0.0	117	47	47
Arizona	2,866	1.2	6,107	1.3	205	2.4	210	1.4	213	3.9	163	13	19
Arkansas	2,297	1.0	3,207	0.7	128	4.7	134	4.5	140	9.4	120	44	44
California	24,408	10.6	62,970	13.3	248	2.0	253	2.0	258	4.0	209	6	6
Colorado	3,027	1.3	6,361	1.3	210	0.0	210	0.0	210	0.0	172	15	14
Connecticut	3,111	1.4	8,697	1.8	264	2.6	271	3.3	280	6.1	225	5	5
Delaware	595	0.3	1,117	0.2	169	5.9	179	5.0	188	11.2	161	21	20
Dist. of Col.	618	0.3	3,541	0.7	576	-1.2	569	0.7	573	-0.5	425	1	1
Florida	10,378	4.5	22,683	4.8	208	1.9	212	3.3	219	5.3	165	11	17
Georgia	5,578	2.4	8,718	1.8	149	2.0	152	2.6	156	4.7	135	36	36
Hawaii	942	0.4	2,172	0.5	222	4.0	231	0.0	231	4.0	187	8	9
Idaho	972	0.4	1,204	0.3	116	3.4	120	3.3	124	6.9	105	50	50
Illinois	11,427	5.0	23,399	4.9	191	2.6	196	4.6	205	7.3	174	16	13
Indiana	5,476	2.4	7,857	1.7	135	3.0	139	2.9	143	5.9	122	42	42
Iowa	2,905	1.3	4,118	0.9	132	3.0	136	4.1	142	7.6	120	43	45
Kansas	2,388	1.0	4,121	0.9	166	1.8	169	2.4	173	4.2	146	29	28
Kentucky	3,658	1.6	5,515	1.2	139	4.3	145	4.1	151	8.6	129	39	39
Louisiana	4,346	1.9	7,405	1.6	161	2.5	165	3.0	170	5.6	145	32	29
Maine	1,127	0.5	2,029	0.4	167	3.6	173	4.0	180	7.8	144	24	30
Maryland	4,228	1.8	12,678	2.7	281	2.1	287	4.5	300	6.8	233	3	4
Massachusetts	5,737	2.5	17,537	3.7	285	3.5	295	3.7	306	7.4	239	2	3
Michigan	9,105	4.0	16,208	3.4	166	3.0	171	4.1	178	7.2	150	26	25
Minnesota	4,131	1.8	8,708	1.8	200	2.0	204	3.4	211	5.5	176	14	12
Mississippi	2,547	1.1	3,066	0.6	112	1.8	114	5.3	120	7.1	105	51	51
Missouri	4,919	2.1	8,914	1.9	170	2.9	175	3.4	181	6.5	150	23	24
Montana	800	0.3	1,167	0.2	140	3.6	145	0.7	146	4.3	126	41	40
Nebraska	1,577	0.7	2,547	0.5	157	1.3	159	1.9	162	3.2	139	34	33
Nevada	865	0.4	1,375	0.3	147	5.4	155	2.6	159	8.2	136	35	35
New Hampshire	944	0.4	1,838	0.4	180	5.0	189	3.2	195	8.3	154	20	22
New Jersey	7,401	3.2	16,258	3.4	201	4.0	209	5.3	220	9.4	181	10	10
New Mexico	1,351	0.6	2,357	0.5	166	3.0	171	1.8	174	4.8	141	27	31
New York	17,541	7.6	52,553	11.1	280	3.2	289	3.8	300	7.1	240	4	2
North Carolina	5,921	2.6	10,089	2.1	162	1.8	165	3.0	170	4.9	140	31	32
North Dakota	661	0.3	999	0.2	143	2.8	147	2.7	151	5.6	132	38	37
Ohio	10,761	4.7	19,743	4.2	170	3.5	176	4.0	183	7.6	155	22	21
Oklahoma	3,193	1.4	4,411	0.9	134	2.2	137	0.7	138	3.0	119	46	46
Oregon	2,666	1.2	5,407	1.1	194	3.1	200	1.5	203	4.6	167	17	15
Pennsylvania	11,866	5.2	25,438	5.4	197	4.6	206	3.9	214	8.6	176	12	11
Rhode Island	947	0.4	2,177	0.5	223	1.3	226	1.8	230	3.1	190	9	8
South Carolina	3,158	1.4	4,711	1.0	143	1.4	145	2.8	149	4.2	125	40	41
South Dakota	688	0.3	899	0.2	118	5.1	124	5.1	131	11.0	113	48	48
Tennessee	4,633	2.0	7,990	1.7	163	2.4	167	3.0	172	5.5	149	30	26
Texas	15,186	6.6	24,927	5.3	159	1.9	162	1.2	164	3.1	138	33	34
Utah	1,565	0.7	2,727	0.6	170	1.8	173	0.6	174	2.4	147	28	27
Vermont	520	0.2	1,299	0.3	231	4.3	241	3.7	250	8.2	192	7	7
Virginia	5,327	2.3	10,482	2.2	186	2.2	190	3.7	197	5.9	165	19	16
Washington	4,222	1.8	8,560	1.8	193	2.1	197	3.0	203	5.2	164	18	18
West Virginia	1,960	0.9	3,002	0.6	141	3.5	146	4.8	153	8.5	130	37	38
Wisconsin	4,744	2.1	8,457	1.8	166	3.6	172	3.5	178	7.2	152	25	23
Wyoming	506	0.2	657	0.1	120	5.0	126	3.2	130	8.3	110	49	49

a/ Columns may not add to total because of rounding.

b/ Excludes 4,736 non-Federal MDs in the possessions.

SOURCE: American Medical Association. Physician Characteristics and Distribution in the U.S., 1983 edition. Chicago, 1984.

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Table 3-13. Distribution of Number of Graduate Residents by Community Size a/

Type of Area	1980 Number	1980 Percent	1981 Number	1981 Percent	1982 Number	1982 Percent	1983 Number	1983 Percent	1984 Number	1984 Percent	Yearly Growth Rate (Percent)
Urban	1,194	89.3	1,256	86.5	1,367	89.8	1,225	89.9	1,355	87.1	3.2
In Urban Areas b/	446	33.4	448	30.9	528	34.7	446	32.7	536	34.5	4.7
Outside Urban Areas c/	748	55.9	808	55.6	839	55.1	779	57.2	819	52.6	2.3
(Small Towns 2,500-25,000)	(510)	(38.2)	(553)	(38.1)	(605)	(39.7)	(533)	(39.1)	(585)	(37.6)	3.5
Rural d/	143	10.7	196	13.5	155	10.2	138	10.1	201	12.9	8.9
Total	1,337	100.0	1,452	100.0	1,522	100.0	1,363	100.0	1,556	100.0	3.9

a/ Numbers of graduates responding to the survey who indicated the size of the community in which they intended to serve. The percentage of all residents responding to the distribution survey varies over the years.

b/ Contained in 'Urbanized areas' are metropolitan areas including suburbs.

c/ Contained in 'Outsize urban areas' are small towns and small cities with population under 100,000.

d/ Contained in 'Rural' areas are the two rural categories, large and small towns.

SOURCE: American Academy of Family Physicians.

Type of Area	Population 1970 Number (in thousands)	Population 1970 Percent	Population 1980 Number (in thousands)	Population 1980 Percent	Yearly Growth Rate (Percent)
Urban:	149,325	73.5	167,051	71.3	1.1
In Urban Areas	118,447	58.3	139,171	58.5	1.6
Outside of Urban Areas	30,878	15.2	27,880	12.8	-1.0
Rural	53,887	26.5	59,495	28.7	1.0
Total	203,212	100.0	226,546	100.0	1.1

SOURCE: U.S. Department of Commerce, Bureau of the Census.

Table 3-14. Total Number of Osteopathic Physicians (DOs), 1975-1984

Year	Total Number Listed DOs	Total Number Active DOs
1975	14,929	14,060
1976	15,572	14,530
1977	16,175	15,090
1978	17,036	15,720
1979	17,975	16,400
1980	18,820	17,140
1981	19,686	17,970
1982	20,559	18,670
1983	21,618	19,690
1984	22,746	20,770

Year	Listed DOs per 100,000 Population	Active DOs per 100,000 Population
1975	6.9	6.5
1976	7.1	6.6
1977	7.3	6.8
1978	7.6	7.0
1979	7.9	7.2
1980	8.2	7.5
1981	8.5	7.8
1982	8.8	8.0
1983	9.3	8.5
1984	9.7	8.8

SOURCES: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1984-85. Chicago, 1984, and U.S. Bureau of the Census. Current Population Report P-25, Nos. 438, 542, 812, 900, 911, 925, and 965. Active estimates for DOs estimated by the Bureau of Health Professions of the Health Resources and Services Administration.

Table 3-15. Osteopathic Physicians (DOs) with Board Certification 1980, 1982 and 1984[a]

	1980		1982		1984	
Certification Board	Number	Percent	Number	Percent	Number	Percent
Anesthesiology	192	5.0	212	4.4	218	3.9
Dermatology	39	1.0	46	1.0	48	0.9
Emergency Medicine	9	0.2	13	0.3	53	0.9
Fellows of AOA	76	2.0	76	1.6	81	1.4
General Practice	1,664	43.2	1,956	40.7	2,163	38.5
Internal Medicine	333	8.6	666	13.9	833	14.8
Neurology/Psychiatry	107	2.8	126	2.6	132	2.4
Nuclear Medicine	67	1.7	71	1.5	77	1.4
Obstetrics/Gynecology	113	2.9	136	2.8	152	2.7
Opthalmology/Otorhino-laryngology	143	3.7	231	4.8	297	5.3
Pathology	108	2.8	115	2.4	221	3.9
Pediatrics	104	2.7	121	2.5	142	2.5
Proctology	56	1.5	72	1.5	72	1.3
Public Health and Preventive Medicine	--	--	--	--	38	0.7
Radiology	339	8.8	367	7.6	403	7.2
Rehabilitation Medicine	55	1.4	63	1.3	72	1.3
General Surgery	282	7.3	330	6.9	363	6.5
Neurologic Surgery	10	0.3	12	0.2	13	0.2
Orthopedic Surgery	106	2.7	131	2.7	158	2.8
Plastic and Reconstructive Surgery	--	--	2	0.0	2	0.0
Thoracic Surgery	17	0.4	22	0.5	27	0.5
Urologic Surgery	35	0.9	40	0.8	48	0.9
Total	3,855	99.9	4,808	100.0	5,613	100.0

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[a] Total may not equal 100 due to rounding.

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1980-81, 1982-83, and 1984-85. Chicago, 1980, 1982 and 1984.

Table 3-16. Distribution of Osteopathic Physicians (DOs)
by Professional Activity, 1982 and 1984

	1982		1984	
Activity	Number	Percent	Number	Percent
Total DOs	20,494	100.0	22,746	100.0
Within U.S.	20,383	99.5	22,643	99.5
Outside U.S.	111	.5	103	.5
Patient Care, Private	12,844	62.7	13,520	59.4
Office-Based	12,442	60.7	13,046	57.3
Hospital-Based	402	2.0	474	2.1
Patient Care, Public	1,808	8.8	1,982	8.7
Government	1,415	6.9	1,582	6.9
Academic/Religious	393	1.9	400	1.8
Training (Interns and Residents)	3,394	16.6	4,117	18.1
Non-patient Care	2,448	12.0	3,127	13.7
Retired	1,325	6.5	1,438	6.3
Other	1,123	5.5	1,689	7.4

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1982-83 and 1984-85. Chicago, 1982 and 1984.

Table 3-17. Distribution of Total Osteopathic Physicians (DOs) by State, 1982 and 1984

Rank 1982 State	Number of DOs 1982	Number of DOs 1984	Percent of DOs 1982	Percent of DOs 1984	Cumulative Percent 1982	Cumulative Percent 1984	Rank 1984
1. Michigan[a]	3,158	3,355	15.4	14.7	15.4	14.7	1
2. Pennsylvania[a]	2,590	2,860	12.6	12.6	28.0	27.3	2
3. Ohio[a]	1,767	1,984	8.6	8.7	36.6	36.0	3
4. Missouri[a]	1,318	1,396	6.4	6.1	43.0	42.1	4
5. Florida[a]	1,218	1,388	5.9	6.1	48.9	48.2	5
6. Texas[a]/	1,182	1,377	5.8	6.1	54.7	54.3	7
7. New Jersey[a]	1,132	1,285	5.5	5.6	60.2	59.9	6
8. Oklahoma[a]	715	823	3.5	3.6	63.7	63.5	8
9. Iowa[a]	582	636	2.8	2.8	66.5	66.3	10
10. Arizona	563	620	2.7	2.7	69.2	69.0	12
11. New York[a]	554	623	2.7	2.7	71.9	71.7	11
12. Illinois[a]	554	648	2.6	2.8	74.5	74.5	9
13. California[a]	478	552	2.3	2.4	76.8	76.9	13
14. Colorado	347	370	1.7	1.6	78.5	78.5	14
15. Kansas	273	295	1.3	1.3	79.8	79.8	15
16. Washington	253	263	1.2	1.2	81.0	81.0	18
17. Maine[a]	250	279	1.2	1.2	82.2	82.2	16
18. Wisconsin	247	276	1.2	1.2	83.4	83.4	17
19. Oregon	241	248	1.2	1.1	84.6	84.5	20
20. Indiana	239	255	1.2	1.1	85.8	85.6	19
21. Massachusetts	156	169	0.8	0.8	86.6	86.4	22
22. Georgia	153	179	0.7	0.8	87.3	87.2	21
23. West Virginia[a]	128	149	0.6	0.7	87.9	87.9	23
24. New Mexico	123	138	0.6	0.6	88.5	88.5	24
25. Rhode Island	91	101	0.4	0.4	88.0	88.9	25
26. Tennessee	80	90	0.4	0.4	89.3	89.3	26
27. Delaware	68	81	0.3	0.4	89.6	89.7	27
28. Minnesota	66	71	0.3	0.3	89.9	90.0	29
29. Virginia	64	76	0.3	0.3	90.2	90.3	28
30. Kentucky	50	61	0.2	0.3	90.4	90.6	30
31. Nevada	47	51	0.2	0.2	90.6	90.8	31
32. Maryland	43	47	0.2	0.2	90.8	91.0	32
33. Connecticut	40	45	0.2	0.2	91.0	91.2	33
34. Vermont	37	36	0.2	0.2	91.2	91.4	38
35. North Carolina	36	44	0.2	0.2	91.4	91.6	34
36. Idaho	36	37	0.2	0.2	91.6	91.8	37
37. Arkansas	33	39	0.2	0.2	91.8	92.0	36
38. Hawaii	30	30	0.2	0.1	92.0	92.1	42
39. Mississippi	27	43	0.1	0.2	92.1	92.3	35
40. South Dakota	27	31	0.1	0.1	92.2	92.4	40
41. Nebraska	25	18	0.1	0.1	92.3	92.5	45
42. Montana	22	33	0.1	0.1	92.4	92.6	39
43. South Carolina	21	17	0.1	0.1	92.5	92.7	47
44. New Hampshire	21	20	0.1	0.1	92.6	92.8	43
45. Alabama	19	31	0.1	0.1	92.7	92.9	41
46. Utah	17	20	0.0	0.1	92.7	93.0	44
47. Wyoming	14	18	0.0	0.1	92.7	93.1	46
48. Louisiana	11	15	0.0	0.1	92.7	93.2	48
49. Alaska	10	13	0.0	0.1	92.7	93.3	49
50. North Dakota	7	11	0.0	0.0	92.7	93.4	50
51. District of Columbia	7	9	0.0	0.0	92.7	93.4	51
52. Guam	1	1	0.0	0.0	92.7	93.4	52
53. Puerto Rico	0	1		0.0			
Subtotal	19,171	21,258	92.7	93.4	92.7	93.4	
Military Service	1,064	1,237	5.2	5.4	97.9	98.8	
U.S. Public Health Service	146	148	0.7	0.7	98.6	99.5	
Canada	53	49	0.3	0.2	98.9	99.7	
Foreign	58	54	0.3	0.2	99.2	99.9	
Total	20,492	22,746	99.2[b]	99.9	99.2[b]	99.9	

[a] States with Colleges of Osteopathic Medicine.

[b] Rounding error.

SOURCE: Compiled from data presented in the AOA Yearbook and Directory of Osteopathic Physicians, 1982-83 and 1984-85. Chicago, 1982 and 1984.

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Table 3-18. Distribution of Total Osteopathic Physicians (DOs) by Age, 1982 and 1984

					Percent Distribution											
	Total Number of DOs		Average Age		Under 35		35-44		45-54		55-64		65 +		Unknown	
Location	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984	1982	1984
U.S.	19,172	21,258	46.8	46.2	28.4	29.7	23.9	25.6	16.2	14.6	13.3	12.6	17.1	16.1	1.2	1.4
Military/USPHS	1,211	1,385	34.8	35.3	61.5	57.0	25.7	31.1	8.0	6.3	3.4	3.8	0.1	0.1	1.3	1.7
Canada	53	49	71.3	70.7	1.9	4.1	1.9	2.0	0.0	0.0	17.0	10.2	79.2	83.7	0.0	0.0
Foreign	58	54	66.8	66.6	1.7	3.7	5.2	9.3	15.5	14.8	6.9	1.9	65.5	64.8	5.2	5.6
Total	20,494	22,746	54.9	54.7	30.2	31.2	22.9	25.8	23.9	14.1	12.7	12.0	16.4	15.4	1.2	1.4

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1982-83 and 1984-85. Chicago, 1981 and 1984.

Table 3-19. Supply of DOs by State, 1981 and 1984, and Percent Change, 1981-1984

	1981		1984		Change, 1981-1984	
	Number	Rank	Number	Rank	Percent	Rank
Michigan	3,123	1	3,355	1	7.4	16
Pennsylvania	2,447	2	2,860	2	16.9	8
Ohio	1,671	3	1,984	3	18.7	5
Missouri	1,287	4	1,396	4	8.5	15
Florida	1,193	5	1,388	5	16.3	7
Texas	1,118	6	1,377	6	23.2	4
New Jersey	1,110	7	1,285	7	15.8	11
Oklahoma	657	8	823	8	25.3	2
Iowa	551	9	636	10	15.4	12
New York	537	10	623	11	16.0	9
Arizona	535	11	620	12	15.9	10
Illinois	517	12	648	9	25.3	1
California	442	13	552	13	24.9	3
Colorado	330	14	370	14	12.1	13
Kansas	266	15	295	15	10.9	14
Maine	237	16	279	16	17.7	6
All DOs	19,686		22,746		15.5 [a]	

[a] Actual 4-year percentage change for all DOs was 15.5 percent, from 19,686 to 22,746.

SOURCES: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1981-82. Chicago, 1981. American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians, 1984-85. Chicago, 1984.

Table 3-20. Numbers of Physicians and Rate Per 10,000 for Selected Industrial Countries a,b/

Country	1950		1960		1970		1980		Percent Increase in Physicians, 1950 to 1980	Percent Increase in Rate per 10,000, 1950 to 1980
	Number of Physicians	Rate per 10,000	Number of Physicians	Rate per 10,000	Number of Physicians	Rate per 10,000	Number of Physicians	Rate per 10,000		
Austria	11,046	15.93	12,890	18.29	13,682	18.51	18,888	25.15	71	58
Australia	8,500	9.84	13,632	13.27	15,000	12.01	26,290	17.99	209	83
Belgium	8,385	9.71	11,703	12.79	14,887	15.38	24,536	24.89	193	156
Canada	13,993	10.19	19,700	11.00	31,166	14.56	NA	NA	NA	NA
Denmark	4,441	10.40	5,650	12.33	7,100	14.40	NA	NA	NA	NA
Finland	1,999	4.99	2,827	6.38	4,795	10.22	9,016	18.87	351	278
France	32,367	7.76	49,194	10.77	68,000	13.39	NA	NA	NA	NA
Fed Rep Germany	65,731	13.15	82,678	14.92	105,976	17.22	139,431	22.65	112	72
Ireland	2,921	9.88	2,952	10.48	3,000	10.20	4,340	13.11	49	32
Italy	57,610	12.23	78,860	15.89	97,003	18.07	NA	NA	NA	NA
Japan	76,446	9.22	101,000	10.84	117,195	11.34	NA	NA	NA	NA
Netherlands	8,000	7.91	12,809	11.16	16,292	12.50	NA	NA	NA	NA
New Zealand	2,397	12.56	2,800	11.80	3,232	11.50	4,880	15.74	104	25
Norway	3,465	10.51	3,957	11.14	5,361	13.82	7,813	19.12	125	81
Spain	28,412	10.11	35,685	11.78	45,335	13.42	86,263	23.05	203	127
Sweden	4,290	7.01	7,130	9.53	10,950	13.62	18,300	22.02	326	214
Switzerland	6,199	13.05	7,227	13.48	8,890	14.22	15,580	24.47	151	87
United Kingdom	38,100	8.70	48,000	10.49	60,000	12.25	NA	NA	NA	NA
U.S.	202,000	13.27	246,000	13.39	323,203	15.78	414,916	18.23	105	38

a/ Rate means number.

b/ NA-data not available.

SOURCE: Adapted from World Health Statistics 1983, World Health Organization, Geneva, Switzerland.

Table 3-21. Number and Acceptance Ratio for Applicants to U.S. Medical Schools, by Gender: Selected Academic Years, 1961-62 Through 1984-85

Academic Year	Number of Schools	Number of Applicants	Percent of Women Applicants	Percent Accepted		Applicants: Acceptance Ratio[a]
				Men	Women	
1961-62	87	14,381	8.1	60.1	63.2	1.7
1967-68	94	18,724	10.4	51.9	50.4	1.9
1971-72	102	29,172	12.8	41.9	45.1	2.4
1977-78	122	40,569	25.1	39.2	40.0	2.5
1978-79	125	36,636	26.1	45.6	43.7	2.2
1979-80	126	36,141	28.3	46.9	46.3	2.1
1980-81	126	36,100	29.5	47.9	46.4	2.1
1981-82	126	36,727	31.8	47.7	45.7	2.1
1984-85[b]	127	35,944	34.7	48.8	45.9	2.1

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[a] Applicant data given for 1977-78 are for 119 schools and exclude the charter classes at Northeastern Ohio University, Rootstown; Marshall University in West Virginia; and Catholic University in Puerto Rico. The applicant:acceptance ratio peaked in 1974-75 at 2:9.

[b] Data for 1984-85 were provided by telephone communication with the Association of American Medical Colleges. Total number of applicants slightly increased from 35,200 in 1983-84.

SOURCES: American Medical Association. "82nd Annual Report on Medical Education in the U.S. 1981-1982." Journal of the American Medical Association, 248:24, December 24/31, 1982; Datagram, Journal of Medical Education, 48, February, 1973; and Datagram, Journal of Medical Education, 57, November, 1982.

Table 3-22. Number and Proportion of Students Repeating the Respective Academic Year for Underrepresented Minorities and All Other Minorities, 1973-1983

	First-Year Class			All Other Classes		
	Total Enrolled	Repeating		Total Enrolled	Repeating	
		Number	Percent		Number	Percent
1973-74						
Underrepresented	1,270	144	11.3	2,478	128	5.2
All Other	12,642	142	1.1	33,477	202	0.6
Total	13,912	286	2.1	35,955	330	0.9
1974-75						
Underrepresented	1,491	202	13.5	2,872	183	6.4
All Other	13,472	162	1.2	36,239	229	0.6
Total	14,963	364	2.4	39,111	412	1.1
1975-76						
Underrepresented	1,419	192	13.5	3,176	181	5.7
All Other	13,808	157	1.1	37,406	262	0.7
Total	15,227	349	2.3	40,582	443	1.1
1976-77						
Underrepresented	1,443	152	10.5	3,398	250	7.4
All Other	14,091	174	1.2	38,867	303	0.8
Total	15,534	326	2.1	42,265	553	1.3
1977-78						
Underrepresented	1,621	171	10.5	3,893	210	5.4
All Other	14,513	242	1.7	40,429	311	0.8
Total	16,134	413	2.6	44,322	521	1.2
1978-79						
Underrepresented	1,646	195	11.8	3,963	225	5.7
All Other	14,974	262	1.7	42,171	351	0.8
Total	16,620	457	2.7	46,134	576	1.2
1979-80						
Underrepresented	1,806	208	11.5	4,064	185	4.6
All Other	15,208	204	1.3	43,117	317	0.7
Total	17,014	412	2.4	47,181	502	1.1
1980-81						
Underrepresented	1,761	256	14.5	4,191	195	4.7
All Other	15,443	308	2.0	44,102	339	0.8
Total	17,204	564	3.3	48,293	534	1.1
1981-82						
Underrepresented	1,886	252	13.4	4,334	206	4.8
All Other	15,434	358	2.3	44,831	322	0.7
Total	17,320	610	3.5	49,165	528	1.1
1982-83						
Underrepresented	1,781	239	13.4	4,488	225	5.0
All Other	15,449	327	2.1	45,168	308	0.7
Total	17,230	636	3.3	49,656	533	1.1

SOURCE: Developed by Division of Medicine Staff (Office of Data Analysis and Special Projects) from data obtained from Association of American Medical Colleges, Office of Minority Affairs.

Table 3-23 A. First-Year U.S. Medical School Enrollment, a/ by Gender: 1978-79 Through 1984-85

	1978-79 (124 Schools)		1979-80 (126 Schools)		1980-81 (126 Schools)		1981-82 (126 Schools)		1982-83 (127 Schools)		1983-84 (127 Schools)		1984-85 (127 Schools)	
Gender	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Men	12,339	74.8	12,217	72.2	12,220	71.1	11,951	69.2	11,792	68.3	11,497	67.0	11,282	66.4
Women	4,162	25.2	4,713	27.8	4,966	28.9	5,317	30.8	5,462	31.7	5,653	33.0	5,715	33.6
Total	16,501	100.0	16,930	100.0	17,186	100.0	17,268	100.0	17,254	100.0	17,150	100.0	16,997	100.0

a/ Includes students repeating, reentering, or continuing.

Table 3-23 B. Total U.S. Medical School Enrollment, by Gender: 1978-79 Through 1984-85

	1978-79 (124 Schools)		1979-80 (126 Schools)		1980-81 (126 Schools)		1981-82 (126 Schools)		1982-83 (127 Schools)		1983-84 (127 Schools)		1984-85 (127 Schools)	
Gender	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Men	47,111	75.7	47,651	74.7	47,886	73.5	47,793	72.1	47,151	70.6	46,692	69.4	45,700	68.2
Women	15,102	24.3	16,149	25.3	17,248	26.5	18,505	27.9	19,597	29.4	20,635	30.6	21,316	31.8
Total	62,213	100.0	63,800	100.0	*65,189	100.0	66,298	100.0	66,748	100.0	67,327	100.0	67,016	100.0

a/ Total includes 35 students whose gender was not reported.

SOURCE: Fall Enrollment Survey, Association of American Medical Colleges.

Table 3-24. Average Tuition, Fees, and Other Expenses for First-Year Medical Students, 1984-85

	Average	Range
Public Medical Schools, Residents[a]		
Tuition	$ 3,516	$ 300 - 8,084
Student Fees	361	0 - 1,775
All Other Expenses[b]	6,989	3,000 - 11,807
Average Cost for Residents	10,866	
Public Medical Schools, Nonresidents[a]		
Tuition	7,863	$ 900 - 26,337
Student Fees	361	0 - 1,775
All Other Expenses[b]	6,989	3,000 - 11,807
Average Cost for Nonresidents	15,213	
Private Medical Schools[c]		
Tuition	12,596	$4,500 - 19,600
Student Fees	377	0 - 1,800
All Other Expenses[b]	8,051	2,500 - 13,000
Average Cost-Private	21,024	

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[a] Excludes Uniformed Services University of the Health Sciences, which does not charge tuition or fees.

[b] Includes room and board, books and supplies, transportation, and similar expenses.

[c] Eight private medical schools report a lower tuition for State residents. The higher tuition estimate for these schools was used here. Estimates exclude one school (Caribe-Cayey) for which figures were not available.

SOURCE: Association of American Medical Colleges. Division of Student Programs, February 1985.

Table 3-25. Medical Student Financial Assistance from Federal Programs and for All Sources, 1981, 1982, and 1983 (In millions of $)

	Academic Year			Percent Change 1982-83 to 1983-84
	1981-82	1982-83	1983-84	
Scholarships				
Exceptional Financial Need	$ 4.9	$ 2.4	$ 2.5	+ 4.2
Medical Scientist Training Program	7.7	7.9	7.2	- 8.9
Armed Forces Health Professions	44.8	48.8	51.2	+ 4.9
National Health Service Corps	38.7	23.5	9.1	-61.3
Total Scholarships	96.1	82.6	70.0	-15.3
Loans				
Health Professions Student Loans	24.3	22.9	22.0	- 3.9
Guaranteed Student Loans	228.6	183.2	195.8	+ 6.9
National Direct Student Loans	12.7	14.9	18.2	+22.1
Health Education Assistance Loans	33.1	50.4	78.8	+56.3
Parental Loans for Undergraduate Students	2.0	11.3	18.0	+59.3
Total Loans	$300.7	282.7	332.8	+17.7
College Work Study Program	1.5	1.4	2.7	+92.9
Federal Total	398.3	366.7	405.5	+10.6
Total, All Sources	$465.4	439.8	485.8	+10.5

SOURCE: Compiled by the Health Resources and Services Administration, Bureau of Health Professions, Division of Medicine, from data published by the Association of American Medical Colleges. *Journal of Medical Education*, 1983 and 1984.

Table 3-26. Acceptance Number and Percentage of All Applicants to Medical School, by Underrepresented Minority Status, 1974-75 Through 1984-85

Number of Applicants	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1984-85
Black American	2,423	2,288	2,523	2,487	2,564	2,599	2,594	2,644	2,600	2,620
American Indian	134	132	128	122	133	151	147	160	137	150
Mexican-American	440	427	460	487	433	457	449	515	504	555
Mainland Puerto Rican	177	202	212	203	191	173	191	222	212	253
All Underrepresented	3,174	3,049	3,323	3,299	3,321	3,380	3,381	3,541	3,453	3,578
All Applicants	42,624	42,303	42,155	40,557	36,636	36,141	36,100	36,727	35,730	35,944

Minorities as a Percent of Total Applicants	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1984-85
Black American	5.6	5.4	6.0	6.1	6.9	7.2	7.2	7.2	7.2	7.3
American Indian	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4
Mexican-American	1.0	1.0	1.1	1.2	1.2	1.3	1.2	1.4	1.4	1.5
Mainland Puerto Rican	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7
All Underrepresented	7.3	7.2	7.9	8.1	9.1	9.3	9.4	9.6	9.7	10.0

Acceptance Rates and Numbers		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1984-85
Black American	Percent	43	41	38	39	38	39	41	39	39	40
	Number	1,049	945	966	966	970	1,024	1,057	1,037	1,001	1,049
American Indian	Percent	48	43	30	35	41	42	42	43	41	48
	Number	64	57	39	43	55	64	62	68	56	72
Mexican-American	Percent	49	52	48	47	56	58	53	55	56	52
	Number	217	220	223	227	241	267	240	281	284	286
Mainland Puerto Rican	Percent	43	43	40	46	48	53	53	51	52	50
	Number	76	86	85	93	92	92	102	113	110	126
All Under-represented	Percent	44	43	40	40	41	43	43	42	42	43
	Number	1,406	1,308	1,313	1,329	1,358	1,446	1,461	1,499	1,451	1,533
All Applicants	Percent	35	36	37	39	45	47	47	47	48	48
	Number	15,066	15,365	15,774	15,977	16,527	16,886	17,146	17,286	17,294	17,194

SOURCES: Association of American Medical Colleges. Minority Students in Medical Education: Facts and Figures. November 1983; 1984-85 data were provided through telephone communication with the AAMC.

Table 3-27. First-Year U.S. Medical School Enrollment a/ by Racial/Ethnic Group and Citizenship b/, 1978-79 Through 1984-85

	1978-79		1979-80		1980-81		1981-82		1982-83		1983-84		1984-85	
Racial/Ethnic Group	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
U.S. Citizens														
White	14,048	85.1	14,259	84.2	14,262	85.0	14,218	82.4	14,085	81.6	13,909	81.1	13,606	80.0
Underrepresented Minorities														
Black	1,061	6.4	1,108	6.5	1,128	6.6	1,196	6.9	1,145	6.6	1,173	6.8	1,148	6.8
American Indian or Alaskan Native	47	0.3	63	0.4	67	0.4	70	0.4	62	0.4	75	0.4	77	0.5
Mexican-American/ Chicano	260	1.6	290	1.7	258	1.5	300	1.8	305	1.8	301	1.8	329	1.9
Puerto Rican (Mainland)	75	0.5	86	0.5	95	0.5	105	0.6	114	0.7	109	0.6	118	0.7
(Subtotal)	(1,443)	(8.8)	(1,547)	(9.1)	(1,548)	(9.0)	(1,671)	(9.7)	(1,626)	(9.4)	(1,658)	(9.7)	(1,672)	(9.8)
Other U.S. Students														
Asian or Pacific Islander	452	2.7	502	3.0	572	3.3	765	4.4	936	5.4	983	5.7	1,124	6.6
Puerto Rican (Commonwealth)	179	1.1	226	1.3	241	1.4	250	1.5	229	1.3	235	1.4	236	1.4
Other Hispanic	151	0.9	188	1.1	224	1.3	247	1.4	278	1.6	248	1.4	243	1.4
(Subtotal)	(782)	(4.7)	(916)	(5.4)	(1,037)	(6.0)	(1,262)	(7.3)	(1,443)	(8.4)	(1,466)	(8.5)	(1,603)	(9.4)
Unidentified	--	--	--	--	--	--	6	0.0	9	0.0	4	0.0	5	0.0
Foreign	228	1.4	208	1.3	339	2.0	111	0.6	91	0.5	113	0.7	111	0.7
Total	16,501	100.0	16,930	100.0	17,186	100.0	17,268	100.0	17,254	100.0	17,150	100.0	16,997	100.0

a/ First-year enrollment includes new entrants and students repeating, reentering, or continuing.

b/ U.S. Citizens redefined in 1981-82 and thereafter to include permanent residents.

SOURCE: Association of American Medical Colleges. Fall Enrollment Survey.

Table 3-28. Total U.S. Medical School Enrollment by Racial/Ethnic Group and Citizenship a/
1978-79 Through 1984-85

Racial/Ethnic Group	1978-79 Number	1978-79 Percent	1979-80 Number	1979-80 Percent	1980-81 Number	1980-81 Percent	1981-82 Number	1981-82 Percent	1982-83 Number	1982-83 Percent	1983-84 Number	1983-84 Percent	1984-85 Number	1984-85 Percent
U.S. Citizens														
White	53,720	86.4	54,854	86.0	55,434	85.0	56,201	84.8	56,032	83.9	56,167	83.4	55,232	82.4
Underrepresented Minorities														
Black	3,357	5.7	3,627	5.8	3,708	5.7	3,884	5.9	3,869	5.8	3,892	5.8	3,944	5.9
American Indian or Alaskan Native	202	0.3	212	0.3	221	0.3	229	0.3	235	0.4	250	0.4	257	0.4
Mexican-American/ Chicano	882	1.4	964	1.5	951	1.5	1,040	1.6	1,071	1.6	1,082	1.6	1,126	1.7
Puerto Rican (Mainland)	277	0.4	283	0.4	329	0.5	350	0.5	369	0.6	368	0.5	380	0.6
(Subtotal)	(4,898)	(7.8)	(5,086)	(8.0)	(5,209)	(8.0)	(5,503)	(8.3)	(5,544)	(8.3)	(5,600)	(8.3)	(5,707)	(8.5)
Other U.S. Students														
Asian or Pacific Islander	1,592	2.6	1,777	2.8	1,924	3.0	2,518	3.8	2,936	4.4	3,290	4.9	3,763	5.6
Puerto Rican (Commonwealth)	617	1.0	700	1.1	798	1.2	856	1.3	903	1.4	925	1.4	917	1.4
Other Hispanic	489	0.8	567	0.9	683	1.0	847	1.3	962	1.4	983	1.5	987	1.5
(Subtotal)	(2,698)	(4.4)	(3,044)	(4.8)	(3,405)	(5.2)	(4,221)	(6.4)	(4,801)	(7.2)	(5,198)	(7.7)	(5,667)	(8.5)
Unidentified	—	--	22	0.0	55	0.1	7	0.0	17	0.0	6	0.0	30	0.0
Foreign	897	1.4	794	1.2	1,086	1.7	366	0.5	354	0.5	356	0.5	380	0.6
Total	62,213	100.0	63,800	100.0	65,189	100.0	66,298	100.0	66,748	100.0	67,327	100.0	67,016	100.0

a/ U.S. Citizens redefined in 1981-82 and thereafter to include permanent residents.

SOURCE: Association of American Medical Colleges. Fall Enrollment Survey.

Table 3-29. Applicants to U.S. Schools of Osteopathic Medicine, by Gender, 1976-77 Through 1983-84[a]

Academic Year	Number of Applicants	Men	Women	Percent Female
1976-77	3,707	NA	NA	NA
1977-78	3,918	3,359	559	14.5
1978-79	3,530	2,920	610	17.3
1979-80	3,856	3,091	765	19.8
1980-81	3,786	2,982	804	21.2
1981-82	3,885	2,984	901	23.2
1982-83	3,917	2,952	965	24.6
1983-84	4,051	2,959	1,092	27.0

[a] NA - data not available.

SOURCE: American Association of Colleges of Osteopathic Medicine. Annual Statistical Report, 1984. Rockville, MD, 1984. Data include colleges participating in the American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS).

Table 3-30. Applicants to U.S. Schools of Osteopathic Medicine, by Racial/Ethnic Category, 1976-77 Through 1983-84

Academic Year	Total Applicants	Minority Applicants	Black	Hispanic	American Indian	Asian	Percent Minority
1976-77	3,707	168	59	33	14	62	4.5
1977-78	3,918	220	111	42	12	55	5.6
1978-79	3,530	231	116	38	18	59	6.5
1979-80	3,856	312	113	56	19	104	8.1
1980-81	3,786	319	130	76	15	98	8.4
1981-82	3,885	362	138	92	15	117	9.3
1982-83	3,917	433	150	128	16	139	11.1
1983-84	4,051	530	188	134	37	171	13.1

SOURCE: American Association of Colleges of Osteopathic Medicine, Annual Statistical Report, 1984. Rockville, MD, 1984. Data include colleges participating in the American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS).

Table 3-31. First-Year and Total Enrollment and Graduates in U.S. Schools of Osteopathic Medicine, by Gender, Entering Year 1968 Through 1982

Academic Year	Number of Schools	First-Year Enrollment			Total Enrollment			Graduates		
		Total	Women	Percent Women	Total	Women	Percent Women	Total	Women	Percent Women
1968-69	5	521	21	4.0	1,879	53	2.8	427	8	1.9
1969-70	6	577	14	2.4	1,997	59	3.0	432	12	2.8
1970-71	7	623	17	2.7	2,151	61	2.8	472	11	2.3
1971-72	7	670	29	4.3	2,304	79	3.4	485	18	3.7
1972-73	7	810	56	6.9	2,579	116	4.5	649	18	2.8
1973-74	7	884	83	9.3	2,780	181	6.5	594	17	2.9
1974-75	9	974	106	10.9	3,139	267	8.5	702	44	6.3
1975-76	9	1,038	140	13.5	3,443	362	10.5	809	48	7.2
1976-77	10	1,088	179	16.5	3,671	472	12.9	908	84	9.3
1977-78	12	1,163	192	16.5	3,926	570	14.5	971	68	7.0
1978-79	14	1,322	222	16.8	4,221	688	16.3	1,004	163	16.2
1979-80	14	1,426	265	18.6	4,571	789	17.3	1,059	192	18.1
1980-81	15	1,496	329	22.0	4,940	971	19.7	1,151	202	17.6
1981-82	15	1,582	378	23.9	5,304	1,108	20.9	1,017 a/	186	18.3
1982-83	15	1,682	428	25.4	5,822	1,317	22.6	1,317	261	19.8

a/ Decline attributable to a changeover in one school from a 3-year to a 4-year curriculum.

SOURCE: American Association of Colleges of Osteopathic Medicine. Annual Statistical Report, 1984. Rockville, MD, 1984.

Table 3-32. First-Year Enrollment and Total Enrollment in U.S. Schools of Osteopathic Medicine, by Racial/Ethnic Category, Entering Years 1976 Through 1982

	Number of Students						
Entering Year	First-Year Enrollment	First-Year Minority Enrollment	Black	Hispanic	American Indian	Asian	Percent Minority
1976	1,088	59	26	12	6	15	5.4
1977	1,163	63	26	13	8	16	5.4
1978	1,322	74	31	17	10	16	5.6
1979	1,426	93	40	18	6	29	6.5
1980	1,496	99	40	18	8	33	6.6
1981	1,582	104	37	22	12	33	6.6
1982	1,682	127	38	33	10	46	7.6

	Number of Students						
Entering Year	Total Enrollment	Total Minority	Black	Hispanic	American Indian	Asian	Percent Minority
1976	3,671	155	70	27	16	42	4.2
1977	3,926	173	76	33	19	45	4.4
1978	4,221	192	87	36	24	45	4.5
1979	4,571	241	100	45	26	70	5.3
1980	4,940	252	94	52	19	87	5.1
1981	5,304	301	104	62	26	109	5.7
1982	5,822	355	116	81	25	133	6.1

SOURCE: American Association of Colleges of Osteopathic Medicine. Annual Statistical Report, 1984. Rockville, MD, 1984.

Table 3-33. Interns, Residents, and Other Trainees in Accredited Hospital Graduate Medical Education Programs, by Source of Undergraduate Medical Education, 1950-51 to 1984-85 a/

Academic Year	Internship and Residency Programs							Other Training Programs		
	Positions Offered	Positions Filled	Filled by USMGs/CMG	Filled by FMGs		Positions Vacant		Total Trainees	FMG Trainees	Percent FMGs
				Number	Percent	Number	Percent			
1950-51	28,039	21,525	19,453	2,072	9.9	7,209	25.7	NA	NA	--
1955-56	38,132	31,029	24,995	6,033	19.4	7,104	18.6	NA	NA	--
1960-61	45,333	37,562	27,627	9,935	26.4	7,711	17.1	NA	NA	--
1965-66	51,933	41,568	30,074	11,494	24.9	10,365	20.0	5,725	2,355	41.1
1970-71	61,938	51,015	34,708	16,307	32.0	10,923	17.6	7,822	3,321	42.6
1971-72	65,615	54,578	37,090	17,489	32.0	11,037	16.8	9,173	4,106	44.8
1972-73	65,308	56,244	37,849	18,395	32.7	9,064	13.9	9,038	3,595	39.8
1973-74	66,302	60,113	41,765	18,348	30.5	6,189	9.3	9,324	3,499	37.5
1974-75	68,122	62,512	44,381	18,131	29.0	5,610	8.2	10,854	4,186	38.6
1975-76	NA	NA	NA	NA	--	NA	--	NA	NA	--
1976-77	65,046	60,561	45,065	15,496	25.6	4,485	6.9	9,986	3,748	37.5
1977-78	NA	56,019	42,310	13,709	24.5	NA	--	NA	NA	--
1978-79	NA	63,163	50,342	12,821	20.3	NA	--	NA	NA	--
1979-80	69,036	64,615	52,550	12,070	18.7	4,421	6.4	NA	NA	--
1980-81	66,066	61,465	49,387	12,078	19.7	4,601	7.0	4,086	NA	--
1981-82	72,263	69,738	56,544	13,194	18.9	2,525	3.5	6,563	NA	--
1982-83	73,281	70,523	57,400	13,123	18.6	2,758	3.8	6,841		
1983-84	74,523 b/	72,397	59,176	13,221	18.3	2,126	2.9	NA	NA	--
1984-85	76,200 b/	74,495	61,158	13,337	17.9	1,705	2.2	NA	NA	
1985-86	76,411 c/									

a/ NA-data not available.

b/ Adjusted; actual number of positions calculated on sum of budgeted filled and unfilled positions as of September 1.

c/ Estimated; number of positions reported by program directors in Annual Residency Survey, October 1984.

SOURCES: American Medical Association. Directories of Approved Internships and Residencies, 1951-52 to 1973-74; Directory of Approved Residencies, 1974-75; Directories of Accredited Residencies, 1975-76 and 1977-78; 80/81 Directory of Residency Training Programs Accredited by the Liaison Committee on Graduate Medical Education; Directories of Residency Training Programs Accredited by the Accreditation Council for Graduate Medical Education, 81/82, 82/83, 1983/84, 1984/85 and 1985/86. Chicago.

Table 3-34. Number of Residents on Duty as of September 1, 1984, Rank-Ordered by State

State	Approximate Number of Residents	Percent of Total Residents	Cumulative Percent
1. New York	10,876	14.6	14.6
2. California	7,152	9.6	24.2
3. Pennsylvania	4,768	6.4	30.6
4. Texas	4,321	5.8	36.4
5. Illinois	4,172	5.6	42.0
6. Ohio	3,799	5.1	47.1
7. Massachusetts	2,980	4.0	51.1
8. Michigan	2,980	4.0	55.1
9. New Jersey	2,011	2.7	57.8
10. Maryland	1,937	2.6	60.4
11. Florida	1,713	2.3	62.7
12. Missouri	1,713	2.3	65.0
13. District of Columbia	1,639	2.2	67.2
14. North Carolina	1,639	2.2	69.4
15. Minnesota	1,490	2.0	71.4
16. Connecticut	1,490	2.0	73.4
17. Virginia	1,415	1.9	75.3
18. Louisiana	1,341	1.8	77.1
19. Tennessee	1,341	1.8	78.9
20. Wisconsin	1,266	1.7	80.6
21. Georgia	1,266	1.7	82.3
22. Colorado	894	1.2	83.5
23. Indiana	894	1.2	84.7
24. Washington	894	1.2	85.9
25. Alabama	819	1.1	87.0
26. Arizona	745	1.0	88.0
27. Kentucky	745	1.0	89.0
28. South Carolina	745	1.0	90.0
29. Iowa	670	0.9	90.9
30. Oklahoma	670	0.9	91.8
31. Kansas	596	0.8	92.6
32. Oregon	447	0.6	93.2
33. West Virginia	447	0.6	93.8
34. Arkansas	372	0.5	94.3
35. Hawaii	372	0.5	94.8
36. Mississippi	372	0.5	95.3
37. Rhode Island	372	0.5	95.8
38. Utah	372	0.5	96.3
39. Nebraska	372	0.5	96.8
40. New Mexico	223	0.3	97.1
41. Delaware	149	0.2	97.3
42. Maine	149	0.2	97.5
43. New Hampshire	149	0.2	97.7
44. Vermont	149	0.2	97.9
45. Nevada	74	0.1	98.0
46. North Dakota	74	0.1	98.1
47. South Dakota	74	0.1	98.2
48. Wyoming	a/	a/	--
49. Montana	--	--	--
50. Idaho	a/	a/	--
51. Alaska	--	--	--
Total b/	73,148		

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a/ Less than 1/10th of 1 percent.

b/ Total excludes residents in Puerto Rico.

SOURCE: American Medical Association. *1985-86 Directory of Residency Training Programs*. Chicago, 1985.

Table 3-35. Number of Residents, Rank-Ordered by Specialty, 1984

Specialty	Number of Residents	Percent of Total Residents	Cumulative Percent
1. Internal Medicine	18,167	24.4	24.4
2. Surgery	8,189	11.0	35.4
3. Family Practice	7,408	9.9	45.3
4. Pediatrics	6,025	8.1	53.4
5. Ob/Gyn	4,615	6.2	59.6
6. Psychiatry	4,558	6.1	65.7
7. Anesthesiology	3,894	5.2	70.9
8. Radiology, Diagnostic	3,176	4.3	75.2
9. Orthopedic Surgery	2,842	3.8	79.0
10. Pathology	2,462	3.3	82.3
11. Ophthalmology	1,569	2.1	84.4
12. Transitional Year	1,480	2.0	86.4
13. Neurology	1,408	1.9	88.3
14. Emergency Medicine	1,108	1.5	89.8
15. Otolaryngology	1,047	1.4	91.2
16. Urology	1,043	1.4	92.6
17. Dermatology	779	1.0	93.6
18. Physical Medicine and Rehabilitation	712	1.0	94.6
19. Neurological Surgery	695	0.9	95.5
20. Child Psychiatry	520	0.7	96.2
21. Radiology, Therapeutic	519	0.7	96.9
22. Plastic Surgery	430	0.6	97.5
23. Thoracic Surgery	292	0.4	97.9
24. Allergy and Immunology	258	0.3	98.2
25. Neonatal-Perinatal Medicine	216	0.3	98.5
26. Nuclear Medicine	203	0.3	98.8
27. Preventive Medicine General	199	0.3	99.1
28. Pediatric Cardology	138	0.2	99.3
29. Radiology, Diagnostic (Nuclear)	88	0.1	99.4
30. Occupational Medicine	87	0.1	99.5
31. Combined General Preventive Medicine/Public Health	58	0.1	99.6
32. Aerospace Medicine	54	0.1	99.7
33. Neuropathology	44	0.1	99.8
34. Colon & Rectal Surgery	41	0.1	99.9
35. Forensic Pathology	35	--	--
36. Blood Banking	34	--	--
37. Pediatric Surgery	27	--	--
38. Vascular Surgery	27	--	--
39. Public Health	25	--	--
40. Dermatopathology	23	--	--
Total	74,495		

SOURCE: American Medical Association. 1985-1986 Directory of Residency Training Programs. Chicago, 1985.

Table 3-36. Number and Percentage of Residents in AOA-Approved Osteopathic Programs

	Academic Year 1982-83		Academic Year 1984-85	
Specialty	Number	Percent	Number	Percent
Anesthesiology	50	5.0	80	7.0
Angiography	1	0.1	0	0
Cardiology	14	1.4	11	1.0
Dermatology	1	0.1	1	0.1
Diagnostic Radiology	29	2.9	18	1.6
Emergency Medicine	36	3.6	37	3.3
Endocrinology	0	0	0	0
Gastroenterolgy	10	1.0	8	0.7
General Practice	103	10.4	132	11.6
Hematology	1	0.1	2	0.2
Hematology/Oncology	a/	--	1	0.1
Infectious Diseases	0	0	0	0
Internal Medicine	218	21.9	245	21.6
Medical Diseases of the Chest	10	1.0	13	1.1
Nephrology	0	0	3	0.3
Neurosurgery	8	0.8	8	0.7
Neurology	5	0.5	6	0.5
Nuclear Medicine	1	0.1	0	0
Obstetrics/Gynecology	85	8.5	99	8.7
Oncology	0	0	0	0
Ophthalmology	24	2.4	23	2.0
Orthopedic Surgery	107	10.8	109	9.6
Osteopathic Principles and Practice	4	0.4	0	0
Otorhinolaryngology	12	1.2	17	1.5
Otorhin/Orofacial Plastic Surgery	19	1.9	17	1.5
Pathology	12	1.2	15	1.3
Pediatrics	21	2.1	28	2.5
Proctology	5	0.5	0	0
Psychiatry	4	0.4	10	0.9
Child Psycniatry	0	0	1	0.1
Radiology	45	4.5	48	4.2
Radiation Oncology	0	0	3	0.3
Rehabilitative Medicine	1	0.1	2	0.2
Rheumatology Immunology	0	0	0	0
Surgery	148	14.9	172	15.1
Thoracic Surgery	3	0.3	2	0.2
Urological Surgery	18	1.8	25	2.2
Total	995	99.9	1,136	100.0

a/ No program in existence at that time.

SOURCE: American Osteopathic Association. Yearbook and Directory of Osteopathic Physicians Programs, 1982-83 and 1984-85. Chicago, 1982 and 1984.

Table 3-37. Approximate Number of FMGs in Residency and Percent FMGs of all Residents, September 1, 1984

State	Approximate Number of Residents	FMGs		Percent FMGs of Total Residents
		Number	Percent	
1. New Jersey	2,011	1,240	9.3	61.3
2. New York	10,876	4,129	31.0	37.8
3. Illinois	4,172	1,136	8.5	27.0
4. Michigan	2,980	659	4.9	21.9
5. Delaware	149	35	0.3	23.3
6. Connecticut	1,490	357	2.7	23.5
7. Maryland	1,937	378	2.8	19.7
8. Florida	1,713	341	2.6	19.4
9. Ohio	3,799	646	4.8	17.0
10. Pennsylvania	4,768	816	6.1	17.2
11. Rhode Island	372	62	0.5	15.8
12. District of Columbia	1,639	250	1.9	15.6
13. Missouri	1,713	249	1.9	14.7
14. Nebraska	372	58	0.4	16.3
15. North Dakota	74	17	0.1	17.7
16. Louisiana	1,341	181	1.4	13.2
17. Nevada	74	9	0.1	11.2
18. Tennessee	1,341	149	1.1	11.0
19. Kentucky	745	69	0.5	9.6
20. Kansas	596	60	0.4	10.2
21. Massachusetts	2,980	314	2.4	10.4
22. West Virginia	447	51	0.4	11.9
23. Oklahoma	670	58	0.4	8.7
24. California	7,152	632	4.7	8.8
25. Wisconsin	1,266	109	0.8	8.9
26. Texas	4,321	322	20.4	7.5
27. South Dakota	74	7	0.1	7.6
28. Arizona	745	48	0.4	6.6
29. Alabama	819	59	0.4	7.0
30. Georgia	1,266	86	0.6	6.7
31. Iowa	670	42	0.3	6.0
32. Mississippi	372	17	0.1	4.7
33. Maine	149	9	0.1	5.8
34. Oregon	447	20	0.1	4.2
35. North Carolina	1,639	69	0.5	4.2
36. Virginia	1,415	69	0.5	4.8
37. Hawaii	372	15	0.1	4.1
38. Minnesota	1,490	90	0.7	5.9
39. Utah	372	12	0.1	2.9
40. Indiana	894	42	0.3	4.5
41. New Hampshire	149	3	--	1.9
42. Vermont	149	6	--	3.4
43. South Carolina	745	34	0.3	4.6
44. Colorado	894	26	0.2	2.9
45. New Mexico	223	18	0.1	7.4
46. Washington	894	16	0.1	1.7
47. Wyoming	[a]	1	--	2.4
48. Arkansas	372	17	0.1	4.1
49. Montana	--	0	--	0
50. Idaho	[a]	0	--	0
51. Alaska	--	0	0	0
Total U.S.[c]	--	13,337[b]	99.8	17.9

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[a] Exact information unavailable for calculation.

[b] Of the total number of FMGs, 7,314 are U.S. citizens.

[c] Totals include 304 FMGs in Puerto Rico.

SOURCE: American Medical Association. 1985-86 Directory of Residency Training Programs. Chicago, 1985.

Table 3-38. Sources of Revenues for Undergraduate Medical Education
1975-76, 1980-81, and 1982-83
(in millions of $)

	Revenues								
	Current $			1972 Constant $			Percent of Total		
	1975-76	1980-81	1982-83	1975-76	1980-81	1982-83	1975-76	1980-81	1982-83
Total Revenues	3,389	6,425	8,179	2,747	3,615	3,894	100	100	100
Federal Total	1,221	1,842	2,070	989	1,035	986	36	29	25
Research	823	1,446	1,655	677	813	788	24	23	20
Other	398	396	415	322	222	198	12	6	5
State/Local Government	808	1,452	1,784	655	817	850	24	23	22
Tuition and Fees	156	346	482	126	194	230	5	5	6
Medical Services	609	1,850	2,626	493	1,041	1,250	18	29	32
Other Revenues	595	935	1,216	482	526	579	18	15	15

	Average Annual Rate of Increase				Percent Change
	Current $		1972 Constant $		1972 Constant $
	1975-76 to 1980-81	1980-81 to 1982-83	1975-76 to 1980-81	1980-81 to 1982-83	1975-76 to 1982-83
Total Revenues	13.6	12.8	5.6	1.5	42
Federal Total	8.6	6.0	.9	- 2.5	- 0
Research	11.9	7.0	5.7	- 2.0	18
Other	0.0	2.3	-7.0	- 6.0	-39
State/Local Government	12.4	10.8	4.4	2.0	30
Tuition and Fees	17.3	18.0	9.0	8.9	82
Medical Services	25.0	19.1	16.2	9.6	153
Other Revenues	9.5	14.1	1.8	4.9	104

Schools	1975-76	1980-81	1982-83
Number Reporting to AAMC Annual Survey	111	115	124
Total Number	114	121	127

SOURCE: Assocation of American Medical Colleges, 1984.

Table 3-39. Costs of Graduate Medical Education, 1978-79 and Sources of Federal Support for Graduate Medical Education, 1981 (in millions of $)

	Amount	Percent of Costs	Amount	Percent of Costs	Percent Federal Support
	(in current $)		(in 1972 $)		
Costs					
House Staff Stipends and Benefits	1,600.0		1,064		
Teaching Faculty	376.0		250		
	$1,976.0	100	1,314	100	
Federal Support for GME, Total	805.9	41	413	31	100
Medicare and Federal Share of Medicaid	600.0	33	307	23	74
Direct Costs of Residents Salaries	500.0	27	256	19	62
Clinical Faculty Salaries	100.0	5	51	4	12
VA Support of GME	151.7	8	77	6	19
NIH Trainee Grants and Clinical Fellowships	11.4	1	5	0	1
DOD	NA	--	NA	--	
BHPr	42.9	2	21	2	5
GIM/GP Grants	19.3	1	9	1	2
Family Medicine Grants	23.6	1	12	1	3

SOURCES: Hadley, J. and Tigue, P. Financing Graduate Medical Education: An Update and Suggestions for Reform. Health Policy and Education, 1982. Powell, C.D. and Smith, C.T. "Financing Graduate Medical Education in a Competitive Atmosphere." Hospitals, 8:10, May 1984. (Data presented in the Powell and Smith journal article were derived from the following sources: Health Care Financing Administration unpublished data. Mather, J.H. et al. Health Manpower Education and Training in the Veterans Administration Health Care and Services System, V.A. Report No. 81-6007. Washington, DC, July 1981. National Institutes of Health Basic Data relating to NIH, 1981. Health Resources Administrative Grants Office Table 1 for Grant Cycles, 1981.

Table 3-40. Number of Trainees in Family Medicine Program Components Supported by the Predoctoral Training Grant Program, 1978-1983

Fiscal Year	Elective or Required Family Medicine Courses or Clerkships	Family Medicine Preceptorships	Family Medicine Research Student Assistantship	Totals
1978-79	6,483	2,706	58	9,247
1979-80	6,893	2,734	70	9,697
1980-81	6,746	2,579	65	9,390
1981-82	7,772	3,090	142	11,004
1982-83	8,361	3,317	142	11,820
1983-84	11,262	3,397	205	14,864
Total	47,517	17,823	682	66,022

SOURCE: Bureau of Health Professions, Unpublished grant information, 1984.

Table 3-41. First-Year Enrollments and Graduates of Allopathic and Osteopathic Medical Schools: 1979-1980 Through 1999-2000

	First-Year Enrollments			Graduates		
Academic Year	Total	MD	DO	Total	MD	DO
1979-1980	19,205	17,779	1,426	16,194	15,135	1,059
1980-1981	19,500	18,004	1,496	16,818	15,667	1,151
1981-1982	19,713	18,131	1,582	17,002	15,985	1,017
1982-1983	19,777	18,095	1,682	17,141	15,824	1,317
1983-1984	19,562	17,900	1,662	17,784	16,369	1,415
1984-1985	19,177	17,497	1,680	18,480	16,983	1,497
1985-1986	19,014	17,324	1,690	18,486	16,895	1,591
1986-1987	18,852	17,152	1,700	18,409	16,837	1,572
1987-1988	18,682	16,982	1,700	18,255	16,666	1,589
1988-1989	18,513	16,813	1,700	18,100	16,501	1,599
1989-1990	18,347	16,647	1,700	17,946	16,337	1,609
1990-1991	18,347	16,647	1,700	17,783	16,174	1,609
1991-1992	18,347	16,647	1,700	17,623	16,014	1,609
1992-1993	18,347	16,647	1,700	17,464	15,855	1,609
1999-2000	18,347	16,647	1,700	17,464	15,855	1,609

NOTE: For allopathic schools, first-year enrollments are actual, 1979-1980 through 1984-1985 and are projected under the basic assumption 1985-1986 through 1999-2000; graduates are actual, 1979-1980 through 1983-1984 and are projected under the basic assumption 1984-1985 to 1999-2000; for osteopathic schools, first-year enrollments and graduates are actual, 1979-1980 through 1982-1983 and are projected under the basic assumption 1983-1984 to 1999-2000.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table 3-42. Supply of Active Physicians (MD and DO) by Country of Medical Education Estimated for Base Year 1981, and Projected Basic Series, 1985-2000

Category	Estimated	Projected			
	1981	1985	1990	1995	2000
Number of Active Physicians c/					
All Active Physicians	467,000	520,720	587,680	645,530	696,550
MDs	449,000	498,780	559,500	611,140	656,110
U.S. Trained	343,300	386,660	439,210	484,550	525,800
Canadian Trained	7,000	6,980	7,030	7,060	7,070
Foreign Trained a/	98,700	105,140	113,260	119,530	123,240
DOs	18,000	21,940	28,180	34,390	40,440
Total U.S. Trained b/	361,300	408,590	467,400	518,940	566,240
Rate per 100,000 Population					
All Active Physicians	202.4	218.2	235.4	248.7	259.9
MDs	194.6	209.0	224.1	235.5	244.9
U.S. Trained	148.8	162.0	175.9	186.7	196.2
Canadian Trained	3.0	2.9	2.8	2.7	2.6
Foreign Trained a/	42.8	44.1	45.4	46.1	46.0
DOs	7.8	9.2	11.3	13.3	15.1
Total U.S. Trained b/	156.6	171.2	187.2	199.9	211.3
Percent Distribution c/					
All Active Physicians	100.0	100.0	100.0	100.0	100.0
MDs	96.2	95.8	95.2	94.7	94.2
U.S. Trained	73.5	74.3	74.7	75.1	75.5
Canadian Trained	1.5	1.3	1.2	1.1	1.1
Foreign Trained a/	21.1	20.2	19.3	18.5	17.7
DOs	3.8	4.2	4.8	5.3	5.8
Total U.S. Trained b/	77.4	78.5	79.5	80.4	81.3

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a/ Includes U.S. citizen FMGs.

b/ Includes U.S. trained MDs and all DOs.

c/ Figures may not add to totals due to independent rounding.

Population Base: U.S. Bureau of Census *Current Population Reports* Series P-25, No. 966, issued March 1985, and Series P-25, No. 952, Series II, issued May 1984.

Table 3-43. Supply of Active Physicians (MD and DO) by Country of Medical Education Estimated for Base Year 1981, and Projected Low Series, 1985-2000

	Estimated	Projected			
Category	1981	1985	1990	1995	2000
		Number of Active Physicians c/			
All Active Physicians	467,000	520,440	583,000	632,500	674,800
MDs	449,000	498,510	554,880	598,600	635,370
U.S. Trained	343,300	386,660	438,700	480,460	517,750
Canadian Trained	7,000	6,980	7,030	7,060	7,070
Foreign Trained a/	98,700	104,860	109,160	111,080	110,550
DOs	18,000	21,940	28,110	33,870	39,430
Total U.S. Trained b/	361,300	408,590	466,810	514,330	557,180
		Rate per 100,000 Population			
All Active Physicians	202.4	218.1	233.5	243.7	251.8
MDs	194.6	208.9	222.3	230.6	237.1
U.S. Trained	148.8	162.0	175.7	185.1	193.2
Canadian Trained	3.0	2.9	2.8	2.7	2.6
Foreign Trained a/	42.8	43.9	43.7	42.8	41.3
DOs	7.8	9.2	11.3	13.0	14.7
Total U.S. Trained b/	156.6	171.2	187.0	198.2	207.9
		Percent Distribution c/			
All Active Physicians	100.0	100.0	100.0	100.0	100.0
MDs	96.2	95.8	95.2	94.6	94.0
U.S. Trained	73.5	74.3	75.2	75.9	76.6
Canadian Trained	1.5	1.3	1.2	1.1	1.0
Foreign Trained a/	21.1	20.1	18.7	17.5	16.4
DOs	3.8	4.2	4.8	5.4	5.9
Total U.S. Trained b/	77.4	78.5	80.1	81.3	82.6

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a/ Includes U.S. citizen FMGs.

b/ Includes U.S. trained MDs and all DOs.

c/ Figures may not add to totals due to independent rounding.

Population Base: U.S. Bureau of Census Current Population Reports Series P-25, No. 966, issued March 1985, and Series P-25, No. 952, Series II, issued May 1984.

Table 3-44. Supply of Active Physicians (MD and DO) by Country of Medical Education Estimated for Base Year 1981, and Projected *High Series*, 1985-2000

	Estimated	Projected			
Category	1981	1985	1990	1995	2000
		Number of Active Physicians c/			
All Active Physicians	467,000	521,030	593,700	661,320	722,380
MDs	449,000	499,100	565,390	626,530	681,270
U.S. Trained	343,300	386,660	439,730	488,930	534,440
Canadian Trained	7,000	6,980	7,030	7,060	7,070
Foreign Trained a/	98,700	105,450	118,630	130,540	139,770
DOs	18,000	21,940	28,310	34,790	41,110
Total U.S. Trained b/	361,300	408,590	468,040	523,720	575,550
		Rate per 100,000 Population			
All Active Physicians	202.4	218.3	237.8	254.8	269.5
MDs	194.6	209.1	226.5	241.4	254.2
U.S. Trained	148.8	162.0	176.1	188.4	199.5
Canadian Trained	3.0	2.9	2.8	2.7	2.6
Foreign Trained a/	42.8	44.2	47.5	50.3	52.2
DOs	7.8	9.2	11.3	13.4	15.3
Total U.S. Trained b/	156.6	171.2	187.5	201.8	214.8
		Percent Distribution c/			
All Active Physicians	100.0	100.0	100.0	100.0	100.0
MDs	96.2	95.8	95.2	94.7	94.3
U.S. Trained	73.5	74.2	74.1	73.9	74.0
Canadian Trained	1.5	1.3	1.2	1.1	1.0
Foreign Trained a/	21.1	20.2	20.0	19.7	19.3
DOs	3.8	4.2	4.8	5.3	5.7
Total U.S. Trained b/	77.4	78.4	78.8	79.2	79.7

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a/ Includes U.S. citizen FMGs.

b/ Includes U.S. trained MDs and all DOs.

c/ Figures may not add to totals due to independent rounding.

Population Base: U.S. Bureau of Census *Current Population Reports* Series P-25, No. 966, issued March 1985, and Series P-25, No. 952, Series II, issued May 1984.

Table 3-45. Supply of Physicians (MD and DO) by Gender; Estimated 1970 and 1981; Projected Using the Basic Methodology, 1990 and 2000

	Estimated				Projected			
	1970		1981		1990		2000	
Category	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total Active Physicans	323,200	100.0	467,000	100.0	587,700	100.0	696,500	100.0
Male	301,400	93.3	411,100	88.0	489,400	83.3	553,000	79.4
Female	21,800	6.7	55,800	12.0	98,200	16.7	143,500	20.6

SOURCES: 1970: The Current and Future Supply of Physicians and Physician Specialists, U.S. Department of Health and Human Services, Public Health Services, Health Resources Administration, BHPr, DHPA, Pub. No. (HRA) 80-60.
1981-2000: Bureau of Health Professions General Supply Model.

Table 3-46. Number of Active Physicians (MDs) [a] by Specialty and Percent Change, Estimated 1981 and Projected 1990 and 2000

Specialty	1981	1990	2000	Percent Change 1981-1990	Percent Change 1981-2000
Total	448,800	559,230	655,770	24.6	46.1
Primary Care	180,210	230,670	276,020	28.0	53.2
General and Family Practice	65,600	77,680	89,130	18.4	35.9
Internal Medicine	82,020	107,960	130,140	31.6	58.7
Pediatrics	32,590	45,020	56,750	38.2	74.1
Primary Care with Ob/Gyn	209,390	267,890	320,530	27.9	53.1
Other Medical Specialties	28,340	38,870	49,200	37.1	73.6
Allergy	1,640	1,650	1,630	0.5	-0.5
Cardiovascular Disease	10,730	14,460	17,930	34.7	67.1
Dermatology	6,000	7,870	9,730	31.2	62.2
Gastroenterology	4,600	7,170	9,850	55.8	114.2
Pediatric Allergy	450	400	320	-12.0	29.1
Pediatric Cardiology	750	1,080	1,390	44.1	85.7
Pulmonary Diseases	4,180	6,250	8,345	49.4	99.6
Surgical Specialties	121,210	144,000	162,130	18.8	33.8
Colon and Rectal Surgery	740	770	790	3.9	6.4
General Surgery	37,990	41,930	44,140	10.4	16.2
Neurological Surgery	3,600	4,200	4,550	16.5	26.4
Obstetrics and Gynecology	29,180	37,220	44,510	27.6	52.5
Ophthalmology	13,680	16,520	19,060	20.8	39.3
Orthopedic Surgery	15,200	18,950	21,950	24.7	44.4
Otorhinolaryngology	6,870	7,810	8,500	13.7	23.7
Plastic Surgery	3,370	4,740	5,940	40.6	76.2
Thoracic Surgery	2,280	2,510	2,590	10.2	13.7
Urology	8,310	9,340	10,100	12.4	21.6
Other Specialties	119,050	145,700	168,420	22.4	41.5
Aerospace Medicine	740	850	910	14.9	22.4
Anesthesiology	18,400	21,880	24,390	18.9	32.6
Child Psychiatry	3,540	4,520	5,520	27.8	56.0
Diagnostic Radiology	8,820	13,570	18,110	53.8	105.4
Forensic Pathology	260	220	160	-16.2	-40.4
General Preventive Medicine	890	970	1,060	9.1	18.8
Neurology	6,510	9,330	11,870	43.3	82.4
Occupational Medicine	2,500	2,260	2,010	-9.5	-19.4
Psychiatry	30,250	34,680	38,000	14.6	25.6
Public Health	2,520	1,900	1,270	-24.5	-49.6
Physical Medicine and Rehabilitation	2,570	2,840	2,990	10.6	16.3
Pathology	15,050	18,240	20,620	21.2	37.0
Radiology	12,040	12,210	11,610	1.4	-3.5
Therapeutic Radiology	1,830	2,300	2,600	25.5	41.9
Other Specialties	13,130	19,920	27,300	51.7	107.9

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[a] These figures differ from those published by the AMA since they reflect adjustments to include approximately 90 percent of the physicians who are not classified according to activity status by the American Medical Association and whose addresses are unkown.

NOTE: Figures may not add to totals due to independent rounding.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions.

Table 3-47. Number of Active Physicians (MDs) by Geographic Region, Division, and State and Percent Change Estimated 1981 and Projected 1990 and 2000

	Number of Physicians[a]			Percent Change	
	1981	1990	2000	1981-1990	1981-2000
UNITED STATES[b]	448,800	559,300	655,920	24.6	46.1
NORTHEAST	117,650	142,770	164,830	21.3	40.1
NEW ENGLAND	30,420	39,310	47,500	29.2	56.2
Connecticut	7,940	10,010	11,940	26.0	50.3
Maine	1,670	2,190	2,640	31.1	57.8
Massachusetts	16,070	21,030	25,430	30.9	58.2
New Hampshire	1,560	1,980	2,420	27.0	55.1
Rhode Island	2,050	2,520	3,040	23.1	48.1
Vermont	1,130	1,580	2,050	39.5	81.2
MIDDLE ATLANTIC	87,230	103,460	117,320	18.6	34.5
New Jersey	15,060	17,710	19,990	17.6	32.8
New York	48,480	56,390	63,070	16.3	30.1
Pennsylvania	23,690	29,360	34,260	23.9	44.6
NORTH CENTRAL	100,620	121,180	136,740	20.4	35.9
EAST NORTH CENTRAL	71,670	84,750	94,220	18.3	31.5
Illinois	22,440	26,540	29,290	18.2	30.5
Indiana	7,340	8,860	9,940	20.6	35.5
Michigan	15,330	17,570	19,170	14.6	25.1
Ohio	18,580	21,910	24,500	18.0	31.9
Wisconsin	8,000	9,880	11,300	23.5	41.3
WEST NORTH CENTRAL	28,950	36,430	42,520	25.9	46.9
Iowa	3,940	4,770	5,460	21.1	38.7
Kansas	3,960	4,930	5,580	24.5	41.0
Minnesota	8,160	10,910	13,410	33.7	64.3
Missouri	8,540	10,420	11,920	21.9	39.6
Nebraska	2,520	3,130	3,600	24.2	43.0
North Dakota	960	1,200	1,330	24.8	38.3
South Dakota	870	1,070	1,210	22.8	39.3
SOUTH	131,640	164,790	193,470	25.2	47.0
SOUTH ATLANTIC	72,680	90,360	105,[illegible]	24.3	45.4
Delaware	1,050	1,220	1,330	16.0	26.6
District of Columbia	4,010	4,980	5,820	24.2	45.1
Florida	18,540	22,030	25,150	18.8	35.6
Georgia	8,604	10,730	12,580	24.7	46.3
Maryland	13,320	17,130	20,390	28.6	53.1
North Carolina	9,470	12,010	14,210	26.8	50.1
South Carolina	4,460	5,430	6,220	21.8	39.3
Virginia	10,330	13,360	16,050	29.4	55.3
West Virginia	2,890	3,470	3,970	20.0	37.4
EAST SOUTH CENTRAL	21,100	26,630	31,440	26.2	49.0
Alabama	5,230	6,420	7,320	22.8	39.9
Kentucky	5,250	6,850	8,200	30.4	56.2
Mississippi	2,960	3,760	4,560	27.2	54.0
Tennessee	7,640	9,590	11,360	25.6	48.8
WEST SOUTH CENTRAL	37,880	47,800	56,320	26.2	48.7
Arkansas	2,970	3,850	4,570	29.8	53.8
Louisiana	6,870	8,500	9,890	23.7	43.9
Oklahoma	4,220	5,480	6,750	29.9	59.9
Texas	23,820	29,970	35,120	25.8	47.4
WEST	93,490	122,400	148,950	30.9	59.3
MOUNTAIN	20,240	27,550	34,620	36.1	71.1
Arizona	5,220	6,810	8,440	30.4	61.8
Colorado	6,220	8,480	10,460	36.3	68.1
Idaho	1,100	1,550	2,030	41.2	84.2
Montana	1,130	1,490	1,820	32.1	61.3
Nevada	1,200	1,720	2,190	43.6	82.3
New Mexico	2,200	3,160	4,270	43.7	94.2
Utah	2,560	3,500	4,300	36.8	68.1
Wyoming	620	830	1,110	34.0	79.0
PACIFIC	73,250	94,850	114,320	29.5	56.1
Alaska	640	1,060	1,550	66.1	141.6
California	57,430	73,400	87,440	27.8	52.3
Hawaii	2,140	2,770	3,300	29.3	54.3
Oregon	4,980	6,780	8,540	36.2	71.4
Washington	8,070	10,840	13,500	34.3	67.3

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a/ These figures include about 90 percent of those MDs not classified according to activity status by the American Medical Association.

b/ Includes physicians in the U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions

Table 3-48. Ratio of Active Physicians (MDs) per 100,000 Population by Geographic Region, Division, and State and Percent Change Estimated 1981 and Projected 1990 and 2000

	Physicians per 100,000 Population[a]			Percent Change	
	1981	1990	2000	1981-1990	1981-2000
UNITED STATES[b]	191.1	224.4	245.2	17.4	28.3
NORTHEAST	238.8	294.8	355.2	23.5	48.7
NEW ENGLAND	245.0	308.7	371.9	26.0	51.8
Connecticut	254.2	319.1	389.8	25.5	53.3
Maine	147.4	178.1	201.5	20.8	36.7
Massachusetts	279.1	368.7	463.1	32.1	65.9
New Hampshire	166.5	174.0	177.4	4.5	6.5
Rhode Island	215.3	265.5	328.0	23.3	52.3
Vermont	219.0	274.3	327.5	25.3	49.5
MIDDLE ATLANTIC	236.8	289.9	348.9	22.4	47.3
New Jersey	203.3	235.7	269.2	15.9	32.4
New York	276.1	342.7	133.4	24.1	48.3
Pennsylvania	199.4	250.5	305.7	25.6	53.3
NORTH CENTRAL	170.6	201.1	229.0	17.9	34.2
EAST NORTH CENTRAL	171.6	200.0	226.2	16.6	31.8
Illinois	195.7	230.7	261.8	17.9	33.8
Indiana	133.7	155.9	175.1	16.6	31.0
Michigan	166.4	187.1	208.2	12.4	25.1
Ohio	172.1	203.6	236.6	18.3	37.5
Wisconsin	169.0	196.2	216.7	16.1	28.2
WEST NORTH CENTRAL	167.4	203.6	235.4	21.6	40.6
Iowa	135.1	159.9	183.9	18.4	36.1
Kansas	165.9	200.2	223.8	20.7	34.9
Minnesota	198.4	250.4	298.7	26.2	50.6
Missouri	172.9	205.2	234.7	18.7	35.7
Nebraska	159.2	190.9	216.8	19.9	36.2
North Dakota	145.2	176.6	194.7	21.6	34.1
South Dakota	125.7	152.9	176.3	21.6	40.3
SOUTH	171.0	188.1	195.8	10.0	14.5
SOUTH ATLANTIC	192.4	209.4	215.8	8.8	12.2
Delaware	176.3	193.4	208.2	9.7	18.1
District of Columbia	634.5	993.4	1545.8	56.6	143.6
Florida	182.1	165.4	144.2	-9.2	20.8
Georgia	154.4	173.7	187.6	12.5	21.5
Maryland	312.8	381.5	444.9	22.0	42.2
North Carolina	158.9	185.5	206.9	16.7	30.2
South Carolina	140.0	152.6	159.1	9.0	13.6
Virginia	190.0	224.2	251.2	18.0	32.2
West Virginia	147.4	170.3	192.0	15.5	30.3
EAST SOUTH CENTRAL	142.8	165.2	183.1	15.7	28.2
Alabama	133.2	152.5	165.8	14.5	24.5
Kentucky	142.9	168.1	186.3	17.6	30.4
Mississippi	116.2	136.3	155.1	17.3	33.5
Tennessee	165.0	189.1	209.7	14.6	27.1
WEST SOUTH CENTRAL	155.0	168.7	172.3	8.8	11.2
Arkansas	129.1	149.4	161.1	15.7	24.8
Louisiana	159.8	179.0	191.6	12.0	19.9
Oklahoma	136.0	156.4	171.0	15.0	25.7
Texas	161.6	171.3	169.3	6.0	4.8
WEST	211.1	231.3	238.2	9.6	12.8
MOUNTAIN	172.2	178.8	171.9	3.8	-0.2
Arizona	186.0	170.5	151.3	-8.3	-18.7
Colorado	211.3	225.7	224.5	6.8	6.2
Idaho	114.1	127.9	134.0	12.1	17.4
Montana	142.0	168.1	189.3	18.4	33.3
Nevada	142.2	135.1	114.0	-5.0	-19.8
New Mexico	164.4	205.8	247.4	25.2	50.5
Utah	168.0	171.7	154.9	2.2	-7.8
Wyoming	125.8	118.5	110.8	-5.8	-11.9
PACIFIC	225.2	252.8	269.8	12.3	19.8
Alaska	153.8	203.6	245.1	32.4	59.4
California	237.1	266.7	285.6	12.5	20.5
Hawaii	218.1	243.0	258.5	11.4	18.5
Oregon	186.6	204.3	212.1	9.5	13.7
Washington	190.6	216.3	231.5	13.5	21.5

a/ These figures include about 90 percent of those MDs not classified according to activity status by the American Medical Association.

b/ Includes physicians in the U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions

Chapter 4

PHYSICIAN ASSISTANTS

Introduction

Physician assistants (PAs) are skilled members of the health care team who, working dependently with physicians and under their supervision, provide diagnostic and therapeutic patient care. They take patient histories, perform physical examinations, and order laboratory tests. When medical problems are diagnosed PAs develop treatment plans, and explain them to patients. They recommend medications and drug therapies, and, in a growing number of States, have the authority to write prescriptions.

Specific technical procedures performed by PAs vary with the practice setting, but include a wide range of musculoskeletal, pulmonary, ear, nose and throat, cardiovascular, gastrointestinal, genitourinary, obstetrical and gynecological therapies.

PAs carry out a variety of minor surgical procedures, such as the management of lacerations, abrasions and burns. They may provide pre- and post-operative care. Surgeon assistants (graduates of specialized training programs) and PAs with surgical training often act as first or second assistants in major surgery.

Appropriately trained PAs have demonstrated that they can relieve physicians of essential but time-consuming patient care duties with no decrease in the quality of care provided (Cawley, et al., 1983; USDHEW, 1977). Over the past 15 years, many studies have shown that when properly utilized PAs can increase the availability of primary care services, promote cost savings, and improve practice productivity (NAS, 1978; Perry and Weston, 1983). Acceptance of the concept by employing physicians and patient satisfaction in both ambulatory and nonambulatory settings has been generally positive (Perry, et al., 1981; Spitzer, 1984; CBO, 1979).

The American Academy of Physician Assistants (AAPA), is the national professional society for PAs. The Association of Physician Assistant Programs (APAP), a closely related organization comprised of all accredited PA programs, encourages communication among PA programs and serves as a national information center on PA education. The APAP publishes reference documents on the profession and has conducted several longitudinal surveys of PAs (AAPA, Feb. 1985d). This report includes numerous AAPA and APAP statistics drawn primarily from three sources: Secondary Analysis: 1981 National Survey of Physician Assistants, funded by the National Center on Health Services Research; unpublished data from the AAPA 1985 Masterfile Survey, supported in part by AAPA and the Administration on Aging; and the First Annual Report on Physician Assistant Educational Programs in the United States 1984-85. The data for the AAPA 1985 Masterfile Survey are based on a personal response rate of approximately 50 percent; the data for the 1985 APAP program survey are based on a program response rate of 76 percent. For both these surveys, followup analysis of nonrespondents reveals no significant differences between them and respondents.

Developments in Physician Assistant Practice

National Certification

Once a year the National Commission on Certification of Physician Assistants (NCCPA) administers a competence examination which is open to graduates of accredited PA programs and, under limited conditions, to other qualified persons. Successful completion of the examination confers the title "Physician Assistant-Certified" (PA-C), which is valid for 6 years. Reregistration is every 2 years and requires 100 hours of approved continuing medical education (AAPA, Feb. 1985b). Since 1973, 14,857 formally trained PAs have sat for the NCCPA examination (Oliver, 1985).

Legal Aspects of Physician Assistant Practice

PAs continue to operate in a heterogeneous legal environment. They are permitted to perform medical services with physician supervision in 49 States and the District of Columbia. In 1984, New Jersey remained the only State which limited PA practice to Federal facilities. As of 1984, 44 States had enacted legislation or regulations pertaining to PAs. Legislative enactments which "regulate" PAs have largely replaced the early trend of legislatively defining the physician's authority to "delegate." Although both approaches have advantages and disadvantages, States increasingly are adopting the regulatory authority form because it permits States to exercise more control over PA utilization. Although 31 States now require PAs to graduate from an accredited training program, the regulatory systems including registration and licensure requirements, vary from State to State. Of the States that have enacted enabling legislation, 17 have granted PAs practice authority to prescribe medications from certain classes of drugs (AAPA, Feb. 1985e).

The ambiguity and lack of uniformity of the State regulations have constrained the potential for the full use of PAs (Fasser, et al., 1984; Miller, 1978). Spokespersons for the profession strongly encourage a nationally coordinated State-level effort, to devise uniform practice regulations.

Early concern about the potential for malpractice litigation against physicians because of their employment of PAs has proven to be unfounded. Studies have shown that when PAs are employed, waiting periods are reduced and patients receive more personal care which measurably improves compliance while reducing symptomatic complaints, return visits, and hospitalizations (Light, 1984). For these reasons, the AMA's assistant general counsel stated that "PAs probably hold the potential for being one of the best malpractice tools available at the present time" (Ryser, 1976). No specific studies have yet been conducted on malpractice litigation as a result of PA use; however, there are no reports that the health status of patients under the care of nurse practitioners or PAs has deteriorated (Spitzer, 1984). Insurance premiums for PAs have remained low, indicating that the frequency of litigation is negligible.

Number and Characteristics of PAs

As of January 1983, there were an estimated 15,100 PAs in the country, of whom 12,000-13,000 were estimated to be employed full-time (AAPA, 1983)--an increase of at least 36 percent since 1980, when the estimated active supply was 8,800. Recently redefined enrollment and graduate data indicate that this rapid rate of growth has decelerated. During the past 2 years, the total PA population has grown by approximately 1,900, for a potential employment pool of 17,000. Of this number, between 13,600 and 14,450 are estimated to be clinically active in the profession. (AAPA, Mar. 1985).

In the 1960's, most PAs were young white males with more than 7 years of previous health care experience, usually obtained as military corpsmen. By 1981, 36 percent of the overall PA population were women and 8.6 percent were classified as minorities of whom blacks constituted more than one-third (Table 4-1). A follow-up survey of nonrespondents that year indicated that minorities were underrepresented statistically and that their proportion may have been closer to 12 percent (Carter, et al., June 1984). By 1984, the precentage of women had increased to 41.1 percent and that of minorities had remained the same. It is not known whether minorities continue to be underrepresented in these statistics (AAPA, Mar. 1985.)

Distribution of PAs by
Gender and Race, 1978, 1981, and 1984

	1978		1981		1984	
	Number	Percent	Number	Percent	Number	Percent
Gender						
Women	1,366	30.6	2,208	36.4	2,501	41.1
Men	3,099	69.4	3,847	63.6	3,548	58.9
Total	4,465	100.0	6,055	100.0	6,049	100.0
Race						
White	3,925	87.7	5,513	91.4	5,449	91.4
Black	234	5.2	196	3.3	161	3.0
Hispanic	109	2.4	122	2.0	160	2.7
Other	269	4.7	198	3.3	169	2.9
Total	4,471	100.0	6,029	100.0	5,959	100.0

SOURCES: Carter et al., Secondary Analysis: 1981 National Survey of Physician Assistants, Rockville, MD, June 1984; AAPA 1985 Masterfile Survey, Arlington, VA, Feb. 1985.

Male and female PAs show significant differences in certain professional and sociodemographic characteristics. In general, male PAs earn higher annual incomes, enter family medicine and surgery in larger numbers, and practice more hours per week than female PAs (Table 4-2). Similar differences exist between male and female physicians; however, there are fundamental differences in the processes by which physicians and PAs select medical specialties and choose practice locations (Oliver, et al., 1984).

Physicians choose specialties through residency training, and the choice is relatively independent of the type and location of their subsequent medical practice. When PAs, as dependent practitioners, accept employment, their medical specialty and practice characteristics (type and location) are established simultaneously. Their deployment pattern therefore relates directly to the availability of employment, which in turn originates with either a physician or a health care administrator. Thus, the difference in practice characteristics between male and female PAs may reflect, in part, employer preferences (Oliver, et al.,1984).

Respondents to the 1981 National Survey, by
Gender and Professional Activity

Professional Activity	Males (N = 3,791) Percent	Females (N = 2,223) Percent	Total (N = 6,056) Percent
Employed as a PA			
Patient Care (| 20 Hours/Week)			
Civilian (| 40 Weeks in 1980)[a]	59.7	46.6	54.4
Civilian (40 Weeks in 1980)	11.8	24.3	16.3
Military	12.6	1.0	8.3
Unclassifiable	1.6	1.3	1.4
Non-patient Care[b]	4.6	6.9	5.4
Subtotal	90.4	79.9	85.9
Not Employed as a PA[c]	9.6	20.1	13.4
Unclassifiable			0.7

[a] Study Sample, N = 3,294.
[b] e.g., Medical teaching, administration, research, etc.
[c] e.g., Unemployed, student, in other profession.

SOURCE: Oliver, et al. "Practice Characteristics of Male and Female Physician Assistants." American Journal of Public Health Dec. 1984.

By 1981, almost half of matriculants to PA programs were college graduates and very few were military corpsmen. The percentage of informally trained PAs (those who did not graduate from a PA training program) declined from

7 percent of the responding PA population in 1976 to 3 percent in 1981 (Carter et al., June 1984). Although comparable information is not available from the 1985 Masterfile Survey, it indicated that fully 86.1 percent of respondents had current national certification (AAPA, Feb. 1985a).

The amount of pre-enrollment health care experience declined from a high of 102.6 months in 1973 to an average of 35.2 months in 1984 (AAPA, Feb. 1985a; Carter, et al., June 1984).

The average age at graduation has varied little between 1972 and 1982, from a low of 27.8 years in 1980 to a high of 30.0 years in 1973. The average age of the overall PA population in 1981 was 34 years, and the average at graduation was 28 years (Carter, et al., June 1984) (Table 4-3).

Geographic Distribution

Early PA graduates practiced in the South or Northwest close to the PA programs from which they graduated (Carter, et al., June 1984). However, as the profession has grown, regional distribution of PAs has generally paralleled that of the U.S. population. New York has the largest number of PAs, followed by California, Texas, and Pennsylvania. Almost one-half of PAs are located in the Southeast and Northeast regions of the United States (Table 4-4).

Proportionately, the numbers of PAs are high in many of the country's most rural and sparsely populated States. Each of the four States with the highest PA:population ratio contains isolated communities separated by extensive distances from large population centers, and each of these States has substantial Native American or Alaskan Native populations. No clear correlation with the ratio of physicians to population is apparent from the review of these 10 States.

Comparison of PA to Non-Federal Physician:Population Ratios in States With the Highest and Lowest PA Population Ratios

State	Estimated Number of PAs (per 100,000 Population) 1985	Number of Non-Federal Physicians (per 100,000 Population) 1981
Alaska	33.8	132
North Dakota	17.1	148
South Dakota	16.4	126
New Mexico	16.2	171
District of Columbia	15.3	571

Cont.

Comparison of PA to Non-Federal Physician:Population Ratios in States With the Highest and Lowest PA Population Ratios

State	Estimated Number of PAs (per 100,000 Population) 1985	Number of Non-Federal Physicians (per 100,000 Population) 1981
New Jersey	2.8	209
Indiana	2.6	139
Louisiana	2.1	165
Arkansas	1.7	134
Mississippi	1.3	115

SOURCES: Adapted by the Health Resources and Services Administration, Bureau of Health Professions, from the AAPA Membership Division, Mar. 1985, and from the AMA State Summary Data on Physicians, 1981.

Health Manpower Shortage Areas

In the 1960's PA training programs were created to address a perceived need for greater public access to medical care. In the two decades since, PAs have improved access to and quality of primary medical care in underserved areas.

Under Section 783 of the Public Health Service Act, a funded PA training program must: (1) develop and use methods to encourage graduates to work in Primary Care Health Manpower Shortage Areas (PCHMSAs), such as supervised clinical practice, and (2) develop and use methods to place graduates in positions for which they have been trained, including positions in PCHMSAs. Twenty-three of the 34 Bureau of Health Professions (BHPr)-funded grant recipients for FY 1982 provided information about their graduates placements: approximately 32.6 percent of these graduates have been deployed in shortage areas. A 1981 student survey confirms that the majority of students continue to be willing to work in health manpower shortage areas (APAP, 1981).

PAs and primary care physicians have similar patterns of locating in health manpower shortage areas (counties which are wholly or partially federally designated). Although the PA:population ratio in rural States is high, recent data show a trend for PAs to practice in the more urban shortage areas (Weston, 1984). The increasing number of primary care physicians may affect the geographic distribution of PAs, but it is premature to speculate how.

Size of Community

In 1981, more than one-fourth of patient care PAs were located in small communities of 10,000 or fewer persons; more than one-third were practicing in metropolitan areas with more than 250,000 persons. The percentages of PAs in communities with intermediate populations (10,000-49,999 and 50,000-250,000) were equivalent at 19 and 18 percent, respectively. From 1974 to 1981, there was a shift from the intermediate-population communities to the metropolitan areas (more than 250,000 population), but the proportion of PAs in smaller communities remained essentially unchanged (Carter, et al., June 1984). However, unpublished data from the AAPA 1985 Masterfile Survey reveal a decrease to 19 percent of PAs serving communities of fewer than 10,000 persons. Of PAs surveyed in 1984, well over half practice in communities with a population of fewer than 125,000 persons, and almost one-fifth practice in the country's largest urban centers, those containing more than 1 million persons (AAPA, Feb. 1985a).

There are significant differences between the practice locations of male and female civilian patient care PAs. Women PAs are more likely to practice in large urban communities and less likely to practice in rural areas. More than 90 percent of all female physicians practice in urban areas (Wunderman, 1980). More male than female PAs practice in both medically underserved areas and satellite/remote clinics (Oliver, et al., 1984).

PA Practice Setting by Size of Community, 1984

Size of Community	Number	Percent*
Fewer Than 10,000	1,086	18.6
10,000 to 24,999	660	11.2
25,000 to 49,999	6-7	10.1
50,000 to 124,999	928	15.6
125,000 to 499,999	915	15.5
500,000 to 999,999	571	9.7
1,000,000 to 2,499,999	529	8.7
2,500,000 to 4,999,999	244	4.2
5,000,000 or More	374	6.5
Total	5,914	

*Percents do not total 100 because of rounding.

SOURCE: AAPA 1985 Masterfile Survey, Arlington, VA, Feb. 1985.

Physician Assistant Distribution by Practice Characteristics and Gender, 1981

	Males	Females	Total
	Percent	Percent	Percent
Practice Community Population	(N = 2,221)	(N = 1,020)	(N = 3,241)
Large (| 250,000)	31.5	43.1	35.0
Medium (50,000-250,000)	17.1	20.7	18.2
Small (10,000-50,000)	21.3	16.5	20.0
Rural	30.1	19.7	26.8
Practice in Medically Underserved Areas[a]/[b]/			
Yes	31.8	26.5	30.2
No	68.2	73.5	69.8
Practice in Satellite/ Remote Clinic	(N = 2,242)	(N = 1,020)	(N = 3,262)
Yes	15.4	11.8	14.3
No	84.6	88.2	85.7

[a] Civilian PAs only.
[b] Respondents were asked whether they "considered the community in which they practiced . . . to be medically underserved," and not whether the area was designated by the DHHS as a primary medical care shortage area.

SOURCE: Carter, et al. Secondary Analysis: 1981 National Survey of Physician Assistants, Rockville, MD, June 1984.

Setting

Physician assistants have shown marked flexibility in their ability to work in a wide variety of health care settings. Primary care PAs appear to have little difficulty in adapting to new roles in specialty or inpatient settings and have expanded these practice settings to include Health Maintenance Organizations (HMOs), prepaid group practices, occupational health settings, hospitals, clinics and emergency rooms, correctional institutions, and long-term care facilities (Cawley, et al., 1983; Lichtenstein, 1983) (Table 4-5). The distribution of PA respondents by type of practice setting from 1974 to 1981 shows an increase in the proportion of PAs working in hospitals, nonhospital ambulatory care clinics, and extended care facilities (Carter, et al., Apr. 1984). This distribution showed no marked differences between 1981 and 1984 except a slight increase in hospital-based practice and corresponding decrease in office-based practice (AAPA, Feb. 1985a).

According to the 1981 National Survey of Physician Assistants, minority PAs were less likely than white PAs to work in office-based practices (34.0 percent minority vs. 40.7 percent white) and more likely to work in other clinical facilities such as public clinics (38.5 percent minority vs. 26.3 percent white). Thus, it is not surprising that white PAs see about twice as many patients per week in hospitals as minority PAs or that minority PAs see about twice as many patients per week in other facilities as white PAs. Compared to white PAs, minority PAs see a greater percentage of patients who are nonwhite and are from low-income families covered by Medicaid.

In contrast, white PAs serve a higher percentage of patients who are affluent, are over age 65, and are covered by Blue Cross/Blue Shield or other health insurance plans (Tables 4-4 and 4-7).

Proportionately, fewer female than male civilian patient care PAs were in non-HMO office-based practices in 1981. Women were more likely than men to practice in clinics and HMOs (Carter, et al., June 1984).

Type of Civilian PA Practice Setting by Gender,
1981

Type of Setting	Males (N = 2,221)	Females (N = 1,020)	Total (N = 3,241)
Office-Based	41.2	34.3	39.0
Hospital-Based	33.6	34.2	33.8
Clinic	14.0	17.2	15.0
HMO	4.4	7.8	5.5
Correctional Institution	3.9	1.9	3.3
Other	2.9	4.6	3.4
Total	100.0	100.0	100.0

SOURCE: Oliver, et al., "Practice Characteristics of Male and Female Physician Assistants." American Journal of Public Health. Dec. 1984.

Physicians have not been drawn in sufficient numbers to settings such as prisons and institutions for the chronically, physically, and mentally ill. A 1981 study of physicians in correctional institutions indicates that continuity of care could best be accomplished by the use of nonphysician providers, because a moderate physician turnover normally occurs in such settings (Lichtenstein, 1981). PAs are currently used in various prison systems including those in Maryland, New York, and Oklahoma. As of March 985, the Federal Correctional System employed 256 PAs in its facilities.

Interest in employing PAs in these settings is increasing (Rodino and Sullivan, 1984), and several PA programs have incorporated clinical rotations in correctional facilities in their curricula.

The financial risk to the institutional employer of nonphysician health care providers is usually less significant than that of the private practice employer. Institutional providers of primary health care, realize cost savings of more than 50 percent as a result of salary differences between PAs and physicians, which could create a continued demand for PAs in the institutional setting (Perry and Weston, 1983).

Other data suggest that PAs in organizational settings can provide 63 percent of physician services at 38 percent of physician costs (Cawley et al., 1983). Additionally, a 1981 survey of hospitals with more than 400 beds, which addressed the use and function of PAs now and in the future, found that the hospitals employed PAs to: (1) increase labor supply and (2) fill surgical requirements created by termination of surgical residencies. The consensus of the responding hospitals that used PAs was that PAs contributed significantly to patient care and allowed for general cost containment within the hospital. A majority of the responding surgical chairpersons indicated a desire to expand PA use in the future (Perry, et al., 1981).

Thus, institutional providers of ambulatory care, such as hospital outpatient departments, industries, HMOs, community-based clinics, and Government- operated health programs (e.g., the Veterans Administration (VA) and military health care programs) may employ increasing numbers of PAs and other nonphysician health care providers in place of physicians. In 1984, approximately 550 PAs were employed in 120 of the country's 154 VA hospitals (VA, May 1984).

Medical Specialty

The overall percentage of PAs practicing in primary care specialties has declined from its 1978 and 1981 levels. This is primarily because of the decline of PAs in family practice settings. Although family practice continues to be the most common medical practice specialty, this specialty has experienced the greatest decline in the past 3 years (from 53.5 percent in 1981 to 42.5 percent in 1984). However, the numbers for the other specialties included in the primary care grouping have either leveled off or experienced an increase. Overall, 65.3 percent of PAs in 1984 were working in primary care specialties (Carter, et al., 1984; AAPA, Feb. 1985b).

Surgery specialties employ the second highest number of PAs, according to both the 1981 and the 1984 surveys. There has been a steady increase in surgery and other specialties since 1978. Industrial/occupational medicine represented approximately one-third of the "other" specialties in both 1981 and 1984 (AAPA, Feb. 1985a; Carter, et al., June 1984).

Distribution of Physician Assistants by Specialty, 1978, 1981, and 1984

Specialty	1978 Percent (N - 3,416)	1981 Percent (N - 4,496)	1984 Percent (N - 5,601)
Primary Care Specialties	74.2	74.0	65.3
Family Practice	52.0	53.5	42.5
General Internal Medicine	12.0	9.6	9.2
Emergency Medicine	4.9	4.8	6.4
General Pediatrics	3.3	3.7	4.1
Obstetrics and Gynecology	2.0	2.6	3.1
Medical Subspecialties	6.3	2.9	4.8
Surgical Specialties	11.7	13.4	18.2
Other Specialties	7.8	9.7[a]	11.7[b]
Total	100.0	100.0	100.0

[a] Includes 3.1 percent Industrial/Occupational Medicine.
[b] Includes 4.1 percent Industrial/Occupational Medicine and 1.4 percent Geriatrics.

SOURCE: Carter, et al., Secondary Analysis: 1981 National Survey of Physician Assistants, DHHS, Rockville, MD, June 1984; AAPA 1985 Masterfile Survey, Arlington, VA, Feb. 1985.

In 1981, 83 percent of minority PAs worked in primary care specialties, whereas 75 percent of white PAs did so. Proportionately, twice as many white PAs worked in surgery as minority PAs (15.1 percent white vs. 6.8 percent minority) (Carter, et al., June 1984) (Table 4-8). Analysis of the 1984 data comparing minority to white PA specialty practice characteristics has not been completed.

A comparison of the 1981 and 1984 surveys indicates that the majority of PAs are finding and retaining employment in their profession (if they wish to be employed as PAs): 91 percent of the 1984 PA respondents were employed as PAs (AAPA, Feb. 1985a), compared to 86 percent of the 1981 respondents (Carter, et al., June 1984).

Slightly more than 85 percent of the 1984 respondents to the 1985 Masterfile Survey were in patient care, an increase of 4 percent since in 1981. Both physicians and PAs spend most of their time providing direct patient care services. In 1980, physicians spent an average of 44.5 hours in direct patient care services, compared to 39.4 hours by PAs (Goldfarb, 1981). Of the 1984 respondents who were not employed as PAs (9 percent), the majority were employed in another health field (AAPA, Feb. 1985a).

Because the 1985 Masterfile Survey was primarily interested in the characteristics of patient care PAs, the 1984 breakdown of nonpatient care employment characteristics for PAs is not available. However, in 1981, 2 percent of respondents were in medical teaching; 1 percent, in clinical administration: and less than 1 percent, in clinical research. The distribution of PA respondents by professional activity is almost identical for the 1976, 1978, and 1981 surveys (Carter, et al., June 1984). A greater proportion of the 1981 PA respondents who were employed in non-patient care roles were women (48.5 percent non-patient care PAs vs. 32.7 percent patient care PAs) and persons with 4 or more years of previous college experience (59.1 percent non-patient care PAs vs. 49.7 percent patient care PAs) (Oliver, et al., 1984). Only preliminary data are available from the 1985 Masterfile Survey; therefore, an updated analysis of the differences in employment charactistics between male and female PAs is not yet possible.

Salaries

Median salary for PAs in 1980 was $21,000. The data gathered from the 1976, 1978, and 1981 surveys indicate that (although at a lower base) mean PA salaries have kept pace with mean physician salaries: $15,600 in 1976 (vs. $59,500 for MDs), $17,400 in 1978 (vs. $65,500), and $22,200 in 1980 (vs. $80,900). The PAs earn about one-fourth to one-third as much as physicians, and that ratio has changed little over a recent 5-year period (Carter and Oliver, 1983). Preliminary analysis of data from the 1985 Masterfile Survey and follow-up indicate that the average 1984 salary for PAs was approximately $25,500.

Specialty, years of practice, and gender are the major determinants of salary for PAs. Surgery and occupational medicine pay the highest salaries, and pediatrics and obstetrics/gynecology pay the lowest (Table 4-9). For most specialties, there appears to be little difference between salaries in office and hospital employment settings.

Salaries for male civilian PAs are significantly higher than for females. However, women PAs are more likely to locate in larger communities where salaries are lower, and also are more likely to accept part-time employment, which reduces their annual salary proportionately. Women also tend to work in lower-paying specialties.

Although nonwhites represent only 8 percent of civilian PAs surveyed in 1981, they have slightly higher salaries. (As expected, PAs with the longest employment history earn significantly higher salaries.) For the period 1973-1980 an increment of $790 in salary is associated with each additional year of experience (Carter and Oliver, 1983).

Educational Developments: PA Programs

Accreditation

The American Medical Association (AMA) established an accreditation mechanism for PA programs in 1971 and developed the Essentials and Guidelines of an Educational Program for the Assistant to the Primary Care Physician. AMA revised the Essentials in March 1985. The revision was a cooperative effort of the American Academy of Family Physicians, American Academy of Pediatrics, American Academy of Physician Assistants (AAPA), American College of Physicians, American College of Surgeons, AMA, and the Association of Physician Assistant Programs (APAP). Of particular note is that the publication's title has eliminated the primary care emphasis and has been changed to Essentials and Guidelines of an Accredited Educational Program for the Physician Assistant. This "generalist" focus appears throughout the revised Essentials and reflects AMA's recognition of the need to prepare PA program graduates for expanded settings and roles (AMA, 1985).

Number and General Description

In November 1984, there were 53 accredited PA programs and three surgeon's assistant programs (AMA, 1984). Three of the primary care programs are Federal military-based. The remaining non-Federal programs are divided nearly equally between privately and publicly operated institutions.

Organizational Base for PA Programs,
Civilian and Military

	Primary Care	Surgeon's Assistant
Allopathic Medical School	18	2
Osteopathic Medical School	1	
School of Allied Health or 4-Year College	25	
Community-College	6	
Hospital-Based	3	1
Total	53	3

SOURCE: AMA, Department of Allied Health Education and Accreditation. Accredited Educational Programs for the Assistant to the Primary Care Physician. Chicago, IL, Nov. 1984.

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PA programs award an academic degree and/or certificate upon graduation, depending upon the institution and the educational background of the student. All programs have clinical teaching affiliations with medical schools or medical school faculties, regardless of their institutional setting. There has been a tendency to lengthen programs, as well as increase the number of programs granting a baccalaureate degree. As of March 1985, at least four programs included a third year (or part thereof) in their curricula. Thirty-nine, or 74 percent, of APAP member programs offered a baccalaureate degree or degree option. Currently, three programs offer a masters of science option (APAP, 1985).

Recently, postgraduate programs have emerged to provide advanced educational experiences for PAs in medical and surgical disciplines. Often termed "PA residencies," these programs accept graduates of PA programs and offer additional clinical and structured learning experiences in specialty areas. At least 10 residency programs currently exist, with residencies in surgery, emergency medicine, pediatrics, neonatology, and occupational medicine (APPAP, 1985).

The uniformed services began PA education in the early 1970's and now operate three programs. The Indian Health Service sponsored two training programs for PAs which graduated approximately 180 Native American students; these programs have been discontinued.

Financial Characteristics

Although PA programs receive funding from a variety of sources (Federal, State, institutional, and foundations), Federal support has played an important role in their rapid expansion.

From FY 1972 to FY 1985, the Federal Government, through contracts and grants under Title VII of the Public Health Service Act, expended $92.6 million in demonstration and training programs. Eighty-five percent of primary care PA programs have received support under these programs administered by BHPr (Table 4-10).

The Office of Economic Opportunity, the Model Cities Program, the VA, and the Departments of Labor and Defense earlier committed another $15-$20 million in PA program support. The VA has made a major contribution to developing the profession by participating in training of civilian PAs and by preparing detailed guidelines for use of PAs in VA hospitals. In FY 1983 the VA provided clinical rotations for 633 PA trainees in 48 affiliated programs (VA, May 1984).

The sponsoring institution provides the primary source of internal PA program support which averages $169,581 per year per program (range from $15,000- $388,000). Five programs reported that they receive no financial support from their sponsoring institutions; only six programs reported that they received substantial support (a mean of $107,000/program) directly from student tuition and fees (APAP, May 1985).

BHPr training grants provide the primary source of external financial support for PA programs. Over 70 percent of responding programs reported that they received Federal funds during FY 1984-85. The amount of Federal support provided averaged $130,889 per program (range, $57,000-$274,000/year). In addition to Federal grants, seven of the programs surveyed reported receipt of State support averaging $88,148 per year, and four programs reported financial assistance from other sources (such as Allied Education Centers and contracts from industry) totaling an average of $40,000 per year (range, $10,000- $73,000). The total annual financial support from all sources for PA educational programs averaged $276,919 per program (range, $120,000-$620,000). The Federal grant support provided 35 percent of this total (APAP, May 1985).

Sources of Financial Support for PA Programs

Source of Financial Support	Mean	Range
Internal		
Sponsoring Institution (N = 31)	$169,581	$15,000-388,000
Tuition and Fees (N = 6)	107,167	43,000-186,000
External		
Federal Grants (N = 27)	130,889	57,000-274,000
State (N = 7)	88,143	6,000-200,000
Other (N = 4)	40,000	10,000- 73,000
Total Program Support (N = 37)	$276,919	$120,000-620,000

SOURCE: APAP. First Annual Report on Physician Assistant Educational Programs in the United States 1984-85. Arlington, VA, May 1985.

Curriculum Type and Program Content

Although programs vary in curriculum design because of educational needs, student characteristics, previous experience in health-related fields, and local demand, the typical PA program is 2 years and consists of both didactic and clinical instruction. Preclinical coursework ranging from 6 to 12 months includes courses in anatomy, physiology, microbiology, pharmacology, psychology, clinical medicine, physical diagnosis, preventive medicine, and courses in the behavioral sciences and clinical laboratory procedures. The didactic portion of the educational program is followed by clinical training, lasting 9 to 15 months, which is designed to develop practitioner skills.

The clinical phase consists of rotations and preceptorships in medical disciplines. Practicing physicians supervise these practicums which occur within a hospital, office, clinic, or institutional setting. PAs are educated in those areas of basic medical science and clinical disciplines which prepare them to function as generalists. This includes training in family medicine, internal medicine, obstetrics/gynecology, pediatrics, surgery, concepts of behavioral medicine and psychiatry, pharmacotherapeutics, health maintenance, and ambulatory, emergency, and long-term care (AMA, 1985). PA students are trained to obtain a patient's medical history, perform comprehensive physical examinations and minor surgical procedures, order and complete routine diagnostic tests, develop diagnostic and management plans, provide basic treatment for persons with common illnesses, and respond appropriately to life-threatening emergencies. PAs are also trained to counsel patients on preventive health care topics and to facilitate the referral to the community's health and social service agencies when appropriate (AMA, 1985). The curricula of the surgeon's assistant programs are structurally similar to programs for primary care PAs, except that they place greater emphasis on clinical and technical skills related to surgical patient care. Clinical rotations include general and specialty surgical services.

Over the past decade, studies to measure PA program effectiveness have led to a number of innovations in medical education. PA educators were among the first to use patient management problems, computer-based clinical simulations, clinical algorithms, and patient instructors. Another innovation pioneered by PA programs, particularly MEDEX programs, is the demonstration of how practitioners can be employed in medically underserved areas after completing preceptorships in those areas (Carter, et al., Apr. 1984).

PA educators and practitioners continue to monitor changes in the "real world" of practice and to modify and refine their curricula to be responsive to evolving roles. Both the AAPA and individual programs have conducted role delineation surveys since 1976. As a result, the majority of PA programs have incorporated competence-based or practice-oriented curricula into their educational process (Curry and Luckie, 1984).

The emergence of new roles in preventive medicine, geriatrics, occupational/ public health, surgery, rehabilitative medicine, alcohol/drug abuse, psychiatry, orthopedics, multicultural settings, urban community health, hospice care, women's health, and family/child abuse also has caused modification in program curricula.

Student Enrollment

As of March 15, 1985, 2,396 students were enrolled in the 53 AMA-CAHEA-accredited PA programs and surgeon's assistant programs (AAPA, Mar. 1985), a decline in enrollment of 475 students since the January 1983 reporting period (AAPA, Jan. 1983). The average class size reported for 1982-83 was 28.5 (APAP, 1982-83). The mean class size of the two most recently enrolled PA classes (1983-84 and 1984-85) was 22.4 and 23.9 students, respectively. APAP officials estimate that the total number of PA students currently enrolled in first- and second-year classes is approximately 1,267 and 1,187, respectively (APAP, May 1985).

Applicant and Student Characteristics

Enrollment of women in PA programs has been increasing steadily since the first all-male class matriculated in 1965. In 1978-79, 44 percent of students were women; by 1981-82, the figure was slightly more than one-half. Women now constitute 60 percent of the student population. Women appear to have a slightly greater likelihood of being accepted and enrolling in a PA program than men: 34 percent of female applicants are eventually accepted and enrolled, compared to 31 percent of male applicants (APAP, May 1985). APAP estimates that the ratio of applicants to positions is 4:1 (Oliver, 1985), the same as that reported in 1982.

In both the 1983-84 and 1984-85 classes, the majority of students enrolled were between the ages of 20 and 26. Approximately one-fourth were over 30 and less than 1 percent were under 20 years old.

Seventeen percent of students enrolled in 1984-85 are minorities (non-whites). This is an increase over the 1981-82 reporting period when minorities constituted 11.4 percent of the PA student population (APAP, 1981). Enrollment of both black and Hispanic students has increased since 1981-82, when blacks comprised 5.6 percent of enrollees and Hispanics constituted 2.8 percent (APAP, 1981).

Applicant and Student Characteristics by Gender,
1983-84 and 1984-85 Entering Classes

	1983-84	1984-85		
Gender	Mean Number Enrolled	Mean Number of All Applicants	Mean Number Accepted	Mean Number Enrolled
Female	13.6	50.2	17.3	14.6
Male	9.7	27.4	11.4	9.1

SOURCE: APAP. First Annual Report on Physician Assistant Educational Programs in the United States 1984-85. Arlington, VA, May 1985.

Nearly one-half of the PA students of both the 1983-84 and 1984-85 entering classes held baccalaureate degrees before enrollment in the 34 responding programs, and an additional 16 percent held associate degrees before matriculation (APAP, May 1985). The total percentage of students earning a degree before enrollment (67 percent) correlates closely to the 68 percent reported in APAP's 1981 survey (APAP, 1982).

Student Educational Expenses

In general, nonresident tuition was reported as 50 percent higher than resident tuition. Because the length of the programs varied extensively (from 12 months to 37 months), the data are expressed as the mean cost per month. The expenses associated with books, fees, and equipment represent 15 percent and 11 percent of the total expenses for resident and nonresident students, respectively.

The 1984 National Program Survey did not request information about the specific type and amount of student financial aid which was being received; however, 64.6 percent of students from responding programs reported receiving some sort of financial aid, ranging from 5 to 100 percent of the cost of their educational program.

In a 1981 survey, students indicated that the median amount they received from personal sources was $3,800. The median amount received from sources that require repayment, such as guaranteed student loans, State loans, personal bank loans, or other loans, was $4,900; the median amount received from sources that do not require repayment (veterans benefits, training stipends, scholarships) was $900 (APAP, 1981). There are no Federal financial aid programs specifically geared toward PA students.

Expenses of Students
Enrolled in PA Programs

Expenses	Mean	Range	Mean/Month Program
Tuition			
Resident (N = 37)	$6,378	$1,000-15,600	$274
Nonresident (N = 36)	8,986	4,200-18,200	367
Books, Fees, Equipment (N = 35)	1,129	300- 2,500	NA[a]
Total Student Costs (Tuition Books, Fees, Equipment)			
Resident (N = 35)	7,669	1,600-17,000	330
Nonresident (N = 34)	9,962	4,500-17,000	416
Percentage of Students Receiving Financial Aid (N = 33)	64.6	5-100	

[a] NA = Not Available

SOURCE: APAP. First Annual Report on Physician Assistant Educational Programs in the United States 1984-85. Arlington, VA, May 1985.

Recent PA Graduates

The mean size of the most recent graduating class was reported as 21.9 for 35 responding programs, and the majority of graduates (57 percent) were women. Ninety-one percent of 1984-85 graduates were white/non-Hispanic, 6 percent were either Hispanic or black, and less than 3 percent were classified in the remaining ethnic groups. The majority (55 percent) of recent PA graduates were within the 24-29 age group on admission, 26 percent were 30 years of age or older and less than 1 percent were under age 20. The overall attrition rate reported by 35 program respondents was 9.2. In 1982, data from federally funded programs indicated that the attrition rate was approximately 9 percent and the rates for male and female students did not differ significantly.

The attrition rate relative to the age of the student indicates that those between the ages of 20 and 23 and those 30 and older are nearly twice as likely to withdraw from their program as compared to students aged 24 to 29. The attrition rates among ethnic groups varied extensively. Black/non-Hispanic attrition was markedly higher than any other group (APAP, May 1985).

A Look at The Future

Supply Projections

The AAPA estimates the total PA population has grown by only 1,862 over the past 2 years for a potential employment pool of 16,962 (AAPA, Mar. 1985). If 5 to 10 percent accurately represents the number of graduates who never take the national certifying exam, then National Commission on Certification of Physician Assistants statistics reinforce the accuracy of the estimate of the current number of PAs (approximately 17,000).

Based on the information available during the 1983 reporting period, a 20 percent inactive rate was used to determine PA supply. The 20 percent inactive rate was applied to the 15,100 known PAs in 1983, the supply of practicing PAs was estimated to be 12,080. Preliminary analysis of the data from the AAPA 1985 Masterfile Survey indicates that 86 percent were currently actively certified. It also shows that the inactive rate for the profession appears to be somewhat less than the 20 percent estimated in 1983; therefore, an inactive rate of 14 percent will be used for this report.

If a 14 percent inactive rate is applied, the current supply of practicing PAs is estimated to be 14,620. Training programs add an annual supply of approximately 1,200 new PAs. Under the assumption that 85 percent of graduates find and keep employment of PAs, an annual increment of 1,020 PAs would be expected, based on current numbers of graduates. Using this approximation for a straight-line projection and ignoring death and retirement, which should be minimal for this relatively young profession, the total number of practicing PAs would reach 20,740 by the end of 1990.

In 1981, the Graduate Medical Education National Advisory Committee (GMENAC) projected the 1990 practicing population to be 20,800, using 1978 baseline data. Current projections based on 1985 data demonstrate a close correlation to GMENAC supply projections for PAs in 1990. Specific data on attrition from the profession are needed to improve the accurancy of supply projections.

Requirements

The current complexity of the health care system and uncertainty about economic and political developments that will affect the roles that PAs fill make numerical projection of future requirements impossible. Key issues that may influence the need for PAs in the years to come include: (1) health care financing issues; (2) projected physician oversupply; (3) the aging of the U.S. population; (4) the growing number of women in the profession; and (5) differences among State laws governing PA practice (which has been previously addressed).

Health Care Financing Issues

Although numerous studies have documented the impact and effectiveness PAs exhibit in the health care setting, constraints which affect their full use have changed little. Various State professional practice acts place legal constraints on their services and the narrow eligibility for reimbursement under Medicare restricts their potential for maximal use (Cawley, Mar. 1985; Weston, 1984).

The cost to the physician practitioner for services rendered by PAs is not reimbursable under Medicare Part B or most Blue Shield plans. Twenty-four States provide such reimbursement under Medicaid.

The AAPA is seeking a change to Medicare rules that would allow for reimbursement of physician-type services that PAs provide to Medicare beneficiaries. This change would affect outpatient settings other than certified rural health clinics and certain HMOs, in which PA services are already covered. Reimbursement would be directed to the PA's employer, not to the PA. Conversely, the direct costs for PAs in institutional settings are usually fully reimbursable under Medicare Part A, Medicaid, and most insurance plans (Rosen and Vanderbilt, 1983).

The recent establishment of a Prospective Payment System (PPS) for Medicare reimbursement could profoundly affect the financing of the health care delivery system in years to come. PPS and other systems of payment that may be instituted will be designed to reduce or contain the cost of health care. Therefore, health care providers will be seeking ways to build economies into their operation. PAs, who are trained to perform many services now done by physicians, may become increasingly attractive to physicians and health administrators in settings where their services can be appropraitely reimbursed.

This system could increase demand for PAs in several ways. For example, it will become necessary to use the most qualified and least costly health care provider in order to maintain services while stabilizing income. Hospitals are already shifting portions of their operations to the outpatient sector, because outpatient services do not yet come under the DRG system; therefore, hospitals will rely more on ambulatory units as a means of maintaining fiscal integrity. PA use could expand in these settings to increase efficiency in outpatient operations (Cawley, Mar. 1985). Hospitals may continually cut down the costs of their inpatient services by decreasing the number of residency slots, and early discharge may lead to a greater need for care in intermediate facilities and home health care. Hospitals have long wrestled with the problem of separating the costs of their residency programs from the programs' educational value to the physician. Until now, they have charged these costs to the patient's care. Under PPS, hospitals may reduce costs by reducing their residency slots and relying on PAs.

Projected Physician Oversupply

Opinions differ about the effect of the projected physician surplus on the future of PAs. Increasing competition among providers has been cited as a primary outcome of the oversupply of physicians. Recognizing the potential for reduced earnings, physicians may encourage restrictive policies geared toward physician extenders or may move into underserved practice areas which now provide patients to PA-augmented medical practices.

PAs currently do not appear to pose a threat to a physician's private practice but bring an ability to expand and extend it. Physicians who develop effective managerial and delegatory skills in using PAs may well be the ones who will gain the competitive edge in the future (Light, 1984). PAs generate about four times more in revenue than they earn in salary in primary care practices (Carter et al., June 1984) (Table 4-11). Although it is cost- effective for physicians to use PAs in their practices, it is too early to determine whether the PA will be in direct competition with the new physicians who are seeking practices in areas previously underserved by physicians (Cawley, 1985) or whether these physicians perceive PAs as practice facilitators (USDOL, 1985).

PAs have demonstrated the ability to adapt to changing practice requirements and to provide complementary services which are not competitive to the physician. Examples are preventive and primary care services provided in the home and intermediate care facilities. This flexibility will be an asset in the future as new roles emerge because of the changes in the U.S. health care financing system.

The Aging of the U.S. Population

In the year 2,000, there are likely to be 36 million or more americans aged 65 or older. This is 10 million more than 1980 (USDHHS, 1984). Increased numbers of elderly, who are heavy users of health care services will place increased demands upon the health care system.

Although consideration must be given to the expanded "well elderly" patient population found in primary care practice settings frequented by PAs, a major concern about the aging population is the care of persons at home or in long-term care institutions. This concern is heightened by the economic implications of the shift of older patients who require additional care to a nursing home before returning them to the community to avoid exceeding Medicare allowable costs under the DRG-based reimbursement system.

Studies indicate that physicians have not been widely attracted to geriatric practice (Kane, et al., 1980) (Kleh, 1978). If this trend continues more nonphysician health care providers may be needed to meet new health personnel requirements.

Several reports have demonstrated the effectiveness of PA use in the geriatric setting (Cawley, et al., 1983). Physicians who employ PAs use them to expand the quantity and quality of services provided to their nursing home patients. However, to achieve maximal effectiveness of PAs in the nursing home setting, third-party payors will have to be convinced of the benefits of reimbursing PAs in those settings (Tideiksaar, 1984).

At the 1984 Twelfth Annual Physician Assistant Conference, discussions focused on the need to stimulate and educate faculty about the special health care needs of the elderly. Short-term faculty development at centers of excellence was proposed to improve the quality and quantity of geriatric training in PA programs.

The Report on Education and Training in Geriatrics and Gerontology submitted to Congress in February 1984 reflects the growing concern for PA and other health professionals' faculty development in geriatrics/gerontology (NIA, 1984). In addition to strengthening the overall delivery of services, the report recommended that additional PAs be prepared to work in long-term care institutions and other programs serving the elderly.

In response to the need for PA faculty development in geriatrics/gerontology, the Bureau of Health Professions funded a 2-year contract to Stanford University providing for short-term intense education in major facets of care of the elderly for approximately 22 PA faculty members nationwide. Further support of training for PAs in this area is anticipated in FY 1985.

The Administration on Aging (AoA) awarded the AAPA a grant in FY 1984 to conduct geriatric research activities to assess and improve PAs' knowledge and skills in geriatrics. As part of this project, three surveys were conducted: (1) the "Masterfile Survey," which was sent to the known universe of PAs; (2) the "Instructional Needs in Geriatrics Survey," which surveyed PAs in practice to ascertain their perceived needs for training in geriatrics and their level of involvement with health care problems encountered by the elderly; and (3) the "Teaching in Geriatrics Survey," which was sent to PA programs to identify what topics they were teaching in geriatrics and their perceptions of what should be taught. Both practitioners and programs were polled to determine whether their perceptions of needed topics were congruent. Attitudes of students and practitioners toward the elderly were also addressed.

Preliminary survey results of the AoA/AAPA project indicate that the majority of the PA program offerings in geriatrics (whether required or elective) are a recent occurrence. Before 1979-80, there were only 16 required and/or elective courses in geriatrics. Since 1979, these numbers have increased dramatically to approximately 44. This expansion was directly related to the increased Federal initiative to encourage geriatrics training of health care professionals. A survey of BHPr FY 1984 training grant projects shows that more than 75 percent have included geriatrics to some degree, in either their didactic or clinical curriculum.

The AoA/AAPA project survey results also found that most of the PA programs coursework geared toward the elderly was geriatric medicine-oriented rather than gerontology. Therefore, these programs may have to place more emphasis on the psychosocial aspects of aging.

The Growing Number of Women in the Profession

If the current trend continues, women in the profession will outnumber men. From 1981 to 1984, there was an increase of 13.3 percent in the number of practicing women PAs. In 1981, women constituted slightly more than one-half of the student population, and as of 1984, this proportion had grown to 62 percent. The impact of this trend remains to be seen. Compared to men, women tend to be underrepresented in family medicine and surgery and overrepresented in internal medicine, pediatrics, and obstetrics/gynecology. They are more commonly employed in a clinic practice or HMO located in medium-sized to large communities, allocate their time differently in the practice setting, and are more frequently unemployed (often by choice). The distribution of PAs by specialty and practice setting may show an increase in those areas currently frequented by women; however, marketplace determinants may be a controlling factor, and the number of women in predominantly male specialties and settings may increase. Because the inactive rate for females in the profession is twice that of males, the percentage of inactive PAs will probably continue to increase as women PAs choose to become unemployed for personal reasons. Although these women are likely to become active PAs as their personal or family obligations change, the increased number of women in the profession will affect the active supply.

Summary

The PA profession has experienced rapid growth from the mid-1970's to the mid-1980's; however, the rate of acceleration now appears to have leveled off. PA practice is changing: the largest number of PAs continue to practice in primary care settings, but the proportion continues to drop as a growing number of PAs become employed in medical and surgical specialties and subspecialties. Larger numbers of PAs are also working in industrial/

occupational medicine; increased percentages are working in non-primary care settings such as occupational health clinics, HMOs, hospitals, and institutional settings. However, PAs are still caring for underserved populations in places unattractive to physicians, such as rural areas, inner city neighborhoods, prison systems, and long-term care facilities. Their suitability for expanded practice in these and other settings, such as in intermediate and home health care for the elderly, has been demonstrated. It remains to be seen whether the increase in physician supply will impinge upon the roles of PAs or will decrease the demand for their services. No such trend has yet developed.

Over the past 15 years, numerous reports have shown that PAs increase the availability of primary care services, promote cost savings, and increase productivity in a wide variety of settings. Acceptance of the concept by employing physicians and patient satisfaction, both in quality of care and more personalized care, in both ambulatory and non-ambulatory settings has been generally positive.

Training programs provide PAs with a good foundation of medical knowledge and skills. These programs continue to expand and modify their curricula to be responsive to changes in PA settings and roles. In an effort to be responsive to changing PA roles, the AMA has revised its Essentials and Guidelines of an Accredited Educational Program for the Physician Assistant. The previous emphasis on primary care has been modified in the Essentials and a less restrictive "generalist" focus has been incorporated throughout the revised document.

Although the PA student population has stabilized, the background and demographic characteristics of students continues to move away from those found in the early 1960's. At that time, the typical student was a white male with several years of previous health care experience (usually as a military corpsman) and limited academic background. At present, the majority of PA students are white females with more academic credentials but with fewer years of experience in a health-related occupation. Although the PA profession has been an attractive career pathway for minorities, their numbers have been declining. The minority composition of the PA profession has fluctuated from 18.1 percent in 1975 to 12 percent in 1981 and 9.2 percent in 1984. Blacks represented one-third of the minorities in 1981 and 1984. Current enrollment figures indicate that 14 percent of the most recently enrolled PA class are minorities; almost two-thirds of these students are black and 5 percent are Hispanic. Attrition rates in PA programs have remained stable at 9.2 percent. Women and men have comparable attrition rates from programs. Blacks have the highest rate of attrition.

According to the 1980 data (and reinforced by the 1984 data), attrition from the profession has stabilized and the number of employment opportunities for PAs is good. PA program directors currently report that jobs remain plentiful; however, several national issues affect the future demand for PAs and make that demand difficult to predict:

- The lack of uniformity and ambiguity of State laws governing PA practice have deterred full PA use since the early years of the profession. Although the AAPA has historically encouraged efforts to effect consistency among State statutes, the eventual success of these efforts is questionable.

- Concern over cost containment in the health care sector remains an important issue for the 1980's. The recently enacted Federal legislation establishing fixed reimbursement for Medicare could increase PA use because it will become beneficial to use the most qualified and least costly health care provider in order to maintain services while stabilizing income. In addition, the PPS has already caused hospitals to shift services to the outpatient sector, because outpatient services are not covered under the DRG system. PA use could expand in these settings in both the ambulatory and short-term institutional realms. Hospitals may seek to reduce costs further by cutting their number of residents and substituting them with PAs.

- The current narrow eligibility for Medicare reimbursement through HCFA also has a negative impact upon PA use. Payment is not authorized to physicians' offices for PA services, because they are not considered services incidental to the physician. The increased acceptance and use of PAs in hospitals in various supportive roles including surgery, emergency room, and house-staff duties, as well as the trend toward specialization, could well be the result of the reimbursement system, because PA services are fully reimbursable in the hospital setting. HCFA is studying the potential for enhancing the efficiency of the health care system by changing the regulations related to PAs. The results of these studies will have long-range implications for the use of PAs.

- The current and potential role of PAs in providing care to the growing elderly segment of the Nation's population, in both primary care and institutional settings, is well documented. Increased quality of care, improved relations with patients and families, and decreased geriatric patient mortality through the use of PAs have been demonstrated. To avoid exceeding Medicare allowable costs under the DRG-based reimbursement system, more older patients (who require additional care) may be shifted to intermediate care facilities before they return to the community. PAs have the skill to help fill the growing need for health care providers in these locations in a cost-efficient manner. However, third-party payors will have to be convinced of the benefits of reimbursing PAs in these settings.

The profession has moved from a predominantly male to what trend data indicate may be a predominantly female career. The impact of this trend on future practice profiles remains to be seen. The distribution of PAs by specialty and practice setting may increase in those areas currently frequented by women; however, marketplace determinants could also increase the numbers of women in male-dominated specialties and settings. Because the inactive rate for females is significantly higher than for males, the greater numbers of women in the profession will affect the active supply.

The effect of the projected physician surplus on the future of PAs is uncertain. Studies have demonstrated that PAs generate about four times more revenue than they earn in primary care practices and that they can provide services which are complementary to the physician's. In addition, PAs serve in practice settings which continue to be unattractive to physicians.

The PA profession's adaptability in serving the health care needs of the country in diverse settings has been demonstrated. The profession continues to offer an attractive career option to persons who want to help others in a meaningful and responsible way but who are unable or unwilling to commit themselves to the extended years of intensive education required of physicians.

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Table 4-1. Personal Background and Professional Characteristics of PAs Responding to the 1976, 1978, and 1981 Physician Assistant Graduate Surveys

Characteristic	1976 (N = 3,493)		1978 (N = 4,498)		1981 (N = 5,056)	
	Number	Percent	Number	Percent	Number	Percent
Sex						
Men	2,528	72.5	3,099	69.4	3,807	63.5
Women	958	27.5	1,366	30.6	2,189	36.5
Total	3,486	100.0	4,465	100.0	5,996	100.0
Race/Ethic Origin[a]						
White	2,865	86.5	3,925	87.7	5,460	91.4
Black	195	5.9	234	5.2	195	3.3
Other Minorities	152	4.6	218	4.9	261	4.4
None of the Above	100	3.0	94	2.2	53	.9
Total	3,338	100.0	4,471	100.0	5,969	100.0
Prior Academic Experience[a]						
College With Degree	1,562	46.8	2,067	49.9	2,536	49.7
College Without Degree	1,280	38.3	1,632	39.4	2,148	42.1
No College	496	14.9	445	10.7	419	8.2
Total	3,312	100.0	4,144	100.0	5,103	100.0
Prior Health Care Experience[b]						
Military Corpsmen	1,490	42.6	1,871	41.9	1,801	34.8
Technologist/Technician	734	21.0	898	20.1	1,284	24.9
Registered Nurse	402	11.5	598	13.4	653	12.6
Other Health Fields	610	17.5	589	13.2	811	15.6
No Experience	257	7.4	509	11.4	626	12.1
Type of Training[a]						
Formal	3,242	92.8	4,442	95.0	5,886	97.2
Informal	251	7.2	223	5.0	167	2.8
Total	3,493	100.0	4,465	100.0	6,053	100.0
Professional Activity[a]						
Active	3,065	87.7	3,476	86.6	5,202	86.5
(Patient Care)	(2,837)	(82.1)	(3,278)	(81.7)	(4,873)	(81.0)
(Nonpatient Care)	(198)	(5.6)	(198)	(4.9)	(329)	(5.5)
Inactive	428	12.3	537	13.4	812	13.5
Total	3,493	100.0	4,013	100.0	6,014	100.0

[a] Percentages based on number responding to question.

[b] Percentages based on number responding to question and includes multiple responses.

SOURCE: Carter, et al. Secondary Analysis: 1981 National Survey of Physician Assistants. DHHS, Rockville, MD, June 1984.

Table 4-2. Medical Specialty for Civilian PAs by Gender, 1981

Specialty	Percent Males (N = 2,078)	Percent Females (N = 946)	Percent Total (N =3,024)
Family Medicine	55.5	45.1	50.9
Internal Medicine	11.0	18.1	13.2
Surgery	15.1	10.2	13.5
Pediatrics	2.2	8.2	4.1
Obstetrics/Gynecology	0.5	6.4	2.4
Psychiatry	0.9	1.0	0.9
All Others	16.8	11.0	15.0
Total	100.0	100.0	100.0

SOURCE: Oliver, et al. "Practice Characteristics of Male and Female Physician Assistants." American Journal of Public Health December 1984.

Table 4-3. Gender, Race, and Age of PAs Responding to 1976, 1978, and 1981 Graduate and Student National Surveys, by Year of Graduation

Year of Graduation	Number	Sex Percent		Number	Race Percent		Average Age at Graduation	
		Male	Female		White	Nonwhite	Number	Age
1972	376	82.2	17.8	375	86.4	13.6	354	29.0
1973	566	79.3	20.7	568	85.4	13.6	532	30.0
1974	897	77.6	22.4	899	81.9	18.1	839	29.9
1975	1,215	67.9	32.1	1,216	85.9	14.1	1,140	29.7
1976	1,369	65.3	34.7	1,382	87.3	12.7	1,285	29.3
1977	1,251	63.0	37.0	1,259	89.1	10.9	1,234	29.0
1978	1,093	58.1	41.9	1,093	91.0	9.0	1,074	28.2
1979	1,131	54.0	46.0	1,134	90.5	9.5	1,109	28.5
1980	894	52.8	47.2	899	91.1	8.9	882	27.8
1981	835	49.8	50.2	836	87.6	12.4	825	27.9
1982	810	48.8	51.3	811	88.7	11.3	800	28.0
Total	10,443	62.2	37.8	10,478	87.9	12.1	10,074	28.8

SOURCE: Carter, et al. Secondary Analysis: 1981 National Survey of Physician Assistants. DHHS, Rockville, MD, June 1984.

Table 4-4. Number of PAs per 100,000 Population by Geographic Region and State for Estimated U.S. Population, 1985

	Estimated Number of PAs[a/]	Estimated Number of PAs per 100,00
UNITED STATES	16,962	7.1
NORTHEAST NEW ENGLAND	1,052	8.4
Connecticut	346	11.1
Maine	158	13.4
Massachusetts	379	6.6
New Hampshire	72	7.0
Rhode Island	52	5.5
Vermont	45	8.3
MIDDLE ATLANTIC	3,376	9.3
New Jersey	211	2.8
New York	2,240	13.0
Pennsylvania	961	8.1
NORTH CENTRAL/EAST NORTH CENTRAL	1,886	4.5
Illinois	210	1.8
Indiana	145	2.6
Michigan	585	6.3
Ohio	621	5.8
Wisconsin	325	6.8
WEST NORTH CENTRAL	1,116	6.4
Iowa	223	7.6
Kansas	208	8.6
Minnesota	140	3.3
Missouri	156	3.1
Nebraska	161	10.0
North Dakota	114	17.1
South Dakota	114	16.4
SOUTH/SOUTH ATLANTIC	3,171	7.9
Delaware	22	3.6
District of Columbia	87	15.3
Florida	691	6.0
Georgia	540	9.3
Maryland	630	14.5
North Carolina	771	12.5
South Carolina	201	6.0
Virginia	289	5.1
West Virginia	192	9.6
EAST SOUTH CENTRAL	597	3.9
Alabama	162	4.0
Kentucky	205	5.3
Mississippi	34	1.3
Tennessee	196	4.1

Table 4-4. Number of PAs per 100,000 Population
by Geographic Region and State for Estimated U.S. Population, 1985

	Estimated Number of PAs[a]	Estimated Number of PAs per 100,000
WEST SOUTH CENTRAL	1,423	5.5
Arkansas	41	1.7
Louisiana	95	2.1
Oklahoma	333	10.2
Texas	954	6.0
WEST MOUNTAIN	1,013	7.6
Arizona	222	6.6
Colorado	339	10.2
Idaho	51	4.7
Montana	41	4.9
Nevada	72	6.9
New Mexico	230	16.2
Utah	112	6.4
Wyoming	45	7.7
PACIFIC	2,918	8.4
Alaska	156	33.8
California	2,167	8.5
Hawaii	59	5.6
Oregon	117	3.9
Washington	419	9.2

[a] The total estimated number of PAs in the U.S.; it does not represent the number who are involved in patient care.

SOURCES: Health Resources and Services Administration, Bureau of Health Professions, Rockville, MD, and AAPA Membership Division, Arlington, VA, March 1985.

Table 4-5. Patient Care PAs Responding to the 1981 and 1984 National Surveys by Major Practice Setting

	1981		1984	
Practice Setting	Number	Percent	Number	Percent
Office-Based Practice				
Solo	878	18.0	795	15.2
Single-Specialty Group	449	9.2	642	12.2
Multispecialty Group	298	6.1	377	7.2
Unspecified	126	2.6	--	--
Subtotal	1,751	35.9	1,814	34.6
Hospital-Based Practice				
Federal	287	5.9	299	5.7
State	105	2.2	133	2.5
City/County	245	5.0	227	4.3
Private, Nonprofit	498	10.2	726	13.8
Private, For Profit	229	4.7	256	4.9
Unspecified	36	0.7	--	--
Subtotal	1,400	28.7	1,641	31.2
Clinic-Based Practice				
Prepaid (HMO) Group	214	4.4	358	6.8
Public	286	5.9	317	6.0
Drug and Alcohol Rehabilitation	31	0.6	39	.7
Industrial	142	3.0	153	2.9
Other	164	3.4	63	1.2[a]
Subtotal	887	17.3	930	17.6
Institutional-Based Practice				
Nursing Homes or Extended Care	44	0.9	47	.9
Federal Prison	50	1.0	52	1.0
State/County/City Prison	57	1.2	137	2.6
Military	450	9.2	612	7.1
Subtotal	601	100.0	5,246	100.0
Other	195	4.0	249	5.0
Unspecified	89	1.8	--	--
Total	4,873	100.0	5,246	100.0

[a] Minor emergency center.

SOURCE: Carter, et al. Secondary Analysis: 1981 National Survey of Physician Assistants. DHHS, Rockville, MD, June 1984. AAPA. 1985 Master File Survey. Arlington, VA, Feb. 1985.

Table 4-6. Comparison of Patient Characteristics and Visits Between Minority and White Patient Care PAs Responding to 1981 Survey

Patients	Minority PAs (N = 313)	White PAs (N = 3507)
Percent Male	52.2	50.8
Percent Nonwhite	60.3	31.5
Percent Over Age 65	19.6	25.3
Percent Poor	35.8	21.3
Visits in Complete Week	(N = 300)	(N = 3609)
Office	63.8	56.0
Hospital	19.0	29.8
Other Facility	10.1	4.8

SOURCE: Carter, et al, Secondary Analysis: 1981 National Survey of Physician Assistants, DHHS, Rockville, MD, June 1984.

Table 4-7. Patients by Principal Type of Health Insurance Coverage for Minority and White PAs Responding to 1981 Survey

Source of Coverage	Percent Minority PAs (N = 304)	Percent White PAs (N = 3535)
Medicare	20.8	19.2
Medicaid	21.1	16.8
Blue Cross/Blue Shield	14.1	24.7
Prepayment or HMO	9.3	8.2
Other Insurance	22.9	23.3

SOURCE: Carter, et al, Secondary Analysis: 1981 National Survey of Physician Assistants, DHHS, Rockville, MD, June 1984.

Table 4-8. Comparison of Distribution of Practice Setting and Medical Specialty Between Minority and White PAs Responding to 1981 Survey

	Minority PA (N = 353)		White PA (N = 3,898)	
Practice Setting	Number	Percent	Number	Percent
Office	120	34.0	1,586	40.7
Hospital	97	27.5	1,287	33.0
Other Facility	136	38.5	1,025	26.3
Total	353	100.0	3,898	100.0
Medical Specialty	Number	Percent	Number	Percent
Family Medicine	180	58.3	1,744	48.7
Other Primary Care	77	24.9	925	25.9
Medical Subspecialties	5	1.6	124	3.5
Surgery	21	6.8	542	15.1
Other	26	8.4	244	6.8
Total	309	100.0	3,579	100.0

SOURCE: Carter, et al., Secondary Analysis: 1981 National Survey of Physician Assistants, DHHS, Rockville, MD, June 1984.

Table 4-9. Salaries for PAs by Primary Specialty, 1980

Primary Specialty	Average Salary	Number
Allergy	$21,555	9
Anesthesiology	23,516	6
Cardiology	23,260	35
Dermatology	21,563	8
Emergency Medicine	22,332	153
Endocrinology	22,000	2
Family Practice	21,845	1,557
Gastroenterology	21,444	9
Hematology	19,333	3
Industrial Medicine	25,088	65
Infectious Disease	27,000	2
Internal Medicine	21,733	321
Neurological Surgery-Neurosurgery	21,973	31
Neurology	26,538	8
Obstetrics/Gynecology	17,949	73
Occupational Medicine	24,996	48
Opthalmology	22,250	4
Orthopedic Surgery	22,341	111
Otolaryngology	21,000	11
Pediatrics	19,987	129
Physical Medicine	19,250	4
Plastic Surgery	20,515	13
Psychiatry	22,235	29
Public Health/Preventive Medicine	20,000	19
Pulmonary Medicine	18,833	12
Radiology	25,333	3
General Surgery	22,419	163
Thoracic Surgery	26,660	91
Urology	21,503	29

SOURCE: APAP/AAPA. National Physician Assistant Survey. Arlington, VA, May 1982.

Table 4-10. Health Resources and Services Administration[a]
Support for PA Programs,
FY 1972-1985

Authority PHS Act	Fiscal Year	Amount Funded	Total Number of Programs
HMEIA Contracts Sec. 774(a)	1972	$ 6,090,109	40
	1973	6,208,999	39
	1974	8,129,252	43
	1975	5,994,002	40
	1976	6,247,203	41
	Subtotal	$32,669,565	
Sec. 701(7) and Sec. 783(a)(1)	1977	$ 8,171,441	39
	1978	8,685,074	42
	1979	8,453,666	42
	1980	8,262,968	43
	1981	8,019,000	40
	1982	4,752,000	34
	1983	4,752,000	34
	1984	4,414,850	34
	1985	4,442,076	37
	Subtotal	$59,952,075	
	Total Amount Funded	$92,622,640	

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[a] Formerly Health Resources Administration

SOURCE: U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions Program Files, Rockville, MD., May 1985.

Table 4-11. PA Revenue Generated,
by Gender and Specialty, 1980

	Family Medicine		Internal Medicine		Pediatrics	
	Male	Female	Male	Female	Male	Female
Patients Seen per Year	5,470	4,319	5,030	3,576	5,237	4,309
Average Fee per Patient	$18.30	$19.42	$26.76	$31.48	$16.85	$22.52
Revenue Generated	$100,101	$83,918	$134,603	$112,573	$88,244	$97,039
PA Salary	$23,521	$18,735	$23,584	$19,733	$22,208	$18,648
Salary/Revenue Generated	0.235	0.233	0.175	0.175	0.253	0.192

SOURCE: Carter, et al. Secondary Analysis: 1981 National Survey of Physician Assistants, DHHS, Rockville, MD. June 1984.

Chapter 5

DENTISTRY

Developments in Supply

There were approximately 137,950 active dentists in the United States at the end of 1984, of whom 132,750 were civilian dentists in the 50 States and the District of Columbia and 5,200 were in the Armed Forces (Table 5-1). While the number of dentists has increased continuously over the past several decades, the largest increases have occurred since 1970. The 137,950 dentists in 1984 represent a 35 percent increase over the 1970 level of 102,220.

In 1950 there were about 75,000 active civilian dentists, providing a ratio of 49.8 dentists per 100,000 civilian population. Although the supply of dentists increased in subsequent years, it was outpaced by the rapid population growth of the 1950s and 1960s, and the dentist-to-population ratio actually declined. By 1965 there were 46.5 dentists per 100,000 population. After 1965 the trend of declining ratios of active civilian dentists to civilian population was reversed, and in 1984 the ratio for the entire Nation reached a level of 56.3 per 100,000, the highest it has ever been.

The overwhelming majority, approximately 88 percent, of the Nation's active dentists are in private practice (Table 5-2). The largest proportion of the remaining dentists, 4 percent, are in the Armed Forces. Faculty of dental schools account for about 3 percent, and 2 percent are in advanced training as interns or residents. There are differences in the employment patterns of active male and female dentists; for example, women dentists tend more often to be on the faculty of dental schools.

The number and proportion of women dentists professionally active in the United States continues to grow. In 1980 there were 3,500 active women dentists representing less than 3 percent of the total dentist supply. In 1984 there were 6,980 or 5.1 percent of the total. As the proportion of women enrolled in dental schools continues to increase, it is anticipated that female representation in the work force will grow at an accelerated pace. The number of active women dentists is expected to more than triple by the year 2000.

In 1980 the Bureau of Health Professions reported that there were an estimated 3,630 black dentists representing approximately 2.9 percent of the total active dentist supply. While first-year minority enrollments in dental schools increased steadily between 1971-72 and 1984-85, the proportion of first-year black students remained relatively steady during the period. Nevertheless, the absolute number of black dentists has continued to increase slowly, and is expected to double by the year 2000 if the present rate of enrollment is sustained.

Geographic Distribution. Wide variations in dentist-to-population ratios among regions and States continue to exist (Table 5-3). In 1984 the Northeast had 67.5 active civilian dentists per 100,000 population, the highest ratio among the regions. The West and the Midwest followed, with 61.5 and 57.5 respectively. The South was significantly lower with 45.5. Projections of dentist supply and distribution indicate a continued increase in the dentist-to-population ratio for all regions, with the South expected to achieve the greatest relative change.

As of June 1985, there were 777 sites designated as dental health manpower shortage areas by the Bureau of Health Professions. Through the National Health Service Corps, approximately 400 dentists were serving the designated sites. The most recent study, based on a review started in 1983, shows a decrease in both the number of dental health manpower shortage areas and the number of dentists (1,715) needed in those areas. The number of sites may continue to decline if recent dental graduates select practice locations in less urbanized and more rural areas, and if National Health Service Corps dentists completing their obligations elect to remain in the area where they served their assignment.

Specialization. Approximately 14 percent of active dentists are specialists, with the proportion expected to increase to 17 percent by the end of the century. The number of dental specialists more than doubled from 1970 to 1984, from 9,322 to 19,847 (Table 5-4). This increase was proportionately much higher than the 27 percent increase in general practitioners over the same period.

Orthodontists constitute 35 percent of all dental specialists, numbering more than 6,900 practitioners. Oral and maxillofacial surgery is the next largest specialty with nearly 4,500 practitioners, or 23 percent of the dental specialists. Periodontics and pedodontics have an estimated 2,762 and 2,398 practitioners respectively, followed by 1,667 endodontists and 1,317 prosthodontists. Oral pathology and public health dentistry, although continuing to experience growth, constitute but a small fraction of total dental specialists. Approximately 2 percent of all dental specialists are women, with the largest numbers in pedodontics and orthodontics.

Characteristics of Dental Practice

The American Dental Association conducts a survey of dental practice every 2 or 3 years. The survey provides information on selected characteristics of the private practice of dentistry in the United States. The results of the 1984 survey are based on survey instruments sent to a stratified random sample representing about 4 percent of private practitioners. The survey conducted in March 1984 reflects conditions and characteristics in 1983.

Ownership. Results of the 1984 survey indicate that almost 95 percent of all dentists who worked in private practice either owned or shared in the ownership of their current primary practice (for the purpose of the survey, these dentists are categorized as independent dentists). The remaining 5-plus percent of private practitioners were employed on a salary, commission, or percentage basis. Seventy-four percent of the Nation's private practitioners were in solo private practice; 17 percent practiced with one other dentist; and 9 percent practiced with more than one other dentist. These figures reflect little change over the past 3 years in practice ownership and size.

Alternative forms and settings of practice including health maintenance organizations, franchise/retail practices, and hospital-based dental care began to expand in the early 1980s. However, the traditional private practice of dentistry remains the predominant means for the delivery of dental services.

Selected Characteristics. According to the 1984 survey, dentists spent an average of 42.2 hours per week in the dental office. The average number of weeks worked per year was 47.3, essentially unchanged from 1981.

The average number of patient visits per week was 61.2. The average annual number of patient visits was estimated at 2,895 per dentist in 1983, a slight increase of 2 percent over 1981.

The 1984 survey of dental practice found that direct payment by dental patients accounted for about half of the income of dentists. Private dental insurance made up 44.8 percent of gross income, and government programs made up 4.6 percent. Only 4.7 percent of all independent dentists received no payment from private dental insurance; in contrast, about half of all independent dentists received no payment from government programs.

Many national, State, and local dental organizations as well as individual dentists have begun advertising in the past few years, either as an effort to stimulate the public's awareness of the need for care or to specifically attract new patients. According to the American Dental Association's 1982 Survey of Dental Practice, 30 percent of independent general practitioners were in practices that advertised. The mean advertising expense per year for independent general practitioners who advertised was $2,037.

Income. In 1983 the mean net income for all independent dentists from their primary practices was $61,200. General practitioners had a mean net income of $56,750, whereas for specialists it was $86,420. The mean net income for employed dentists was $43,120. Total practice expenses for independent dentists was approximately 60 percent of their practice gross incomes.

Between 1981 and 1983 the mean net income of general practitioners increased 10.4 percent; for specialists, 13.9 percent. While the Consumer Price Index (CPI) rose 9.5 percent, the dental component of the CPI rose 14.9 percent. Nevertheless, dental fees relative to the All Items Index of the CPI continue to remain fairly stable, moving from a relative value of 0.97 in 1981 to 1.01 in 1983.

Dental Applicants, Students, and Graduates

Dental Applicants. The number of applicants to dental schools increased 157 percent between 1960 and 1975, growing from 6,119 to 15,734 (Table 5-5). Since 1975-76, applicant numbers declined each year to the 1984-85 level of 6,499, a drop of about 9,200 from the 1975-76 peak. The declining trend in applicants since 1975-76, despite a decrease in first-year places since 1978-79, has resulted in a steady increase in the percentage of applicants who actually were enrolled. While 37 percent of all applicants were enrolled in 1975-76, 78 percent of all dental school applicants were enrolled in 1984-85.

Enrollments. First-year enrollments, which were 3,226 in 1950 and 3,806 in 1965-66, stood at 5,047 in 1984-85 (Table 5-6). As a result, total dental school enrollments were 20,588 in 1984-85, a 73 percent increase over the 1950-51 level of 11,981 students. However, dental school enrollments are now well below the peaks reached a few years ago. First-year enrollments peaked at 6,301 in 1978-79 but have since declined steadily every year. Total enrollments continued to grow to 22,842 in 1980-81 but have declined in each of the last 4 years.

The total number of dental schools grew from 42 in 1950 to 60 in 1978, with more than half of the increase occurring since 1965. The number remains at 60, although two dental schools have announced plans to close.

Minorities and Women. The enrollment of minority students in dental schools rose throughout the 1970s and 1980s. First-year minority enrollments increased from 412 (8.8 percent of the total) in 1971-72 to 981 (19.7 percent) in 1984-85 (Table 5-7). The numbers of Asian-American, Hispanic, and American Indian students and their proportion in entering classes showed steady increases throughout the period. First-year Asian-American students increased from 112 to 465 and from 2.4 to 9.3 percent of entering classes. First-year Hispanic students (excluding the University of Puerto Rico) grew from 40 to 200 and from 0.9 to 4.0 percent of entering classes. Although the numbers are small, American Indian students increased from 4 to 17. Recruitment of black students has been relatively less successful. In 1971-72 the 245 first-year black students constituted 5.2 percent of the entering class, while in 1984-85, 299 first-year black students accounted for 6.0 percent. In the intervening years, the proportion of black students in entering classes remained very stable and never exceeded 5.3 percent.

The enrollment of women in dental schools increased dramatically throughout the 1970s and 1980s. Between 1970-71 and 1984-85, women enrolled in dental school increased from 231 to 4,899 and from 1 to 24 percent of total enrollments. The 1,369 women in first-year dental school classes in 1984-85 accounted for 27.1 percent of total first-year enrollment, up from 94 first-year students and 2.1 percent of the entering class in 1970-71 (Table 5-8).

Graduates. During most of the 1950s and 1960s the number of dental graduates remained fairly steady, ranging from about 2,800 to approximately 3,400 a year. By the early 1970s the number of graduates began to rise very noticeably, with 5,336 dentists graduating in 1976. Thereafter, the annual number of dental graduates has fluctuated somewhat, reaching a high of 5,756 in 1983, followed by a decrease to 5,337 in 1984. Nevertheless, the 1984 level of dental graduates represents an increase of 42 percent over the 1970 level. Graduating classes over the next few years will decline in size, reflecting the recent steady decrease in first-year enrollments.

Student Attrition. The freshman attrition rate consistently held to approximately 3.5 percent during the 1970s, but has increased the last few years reaching 6.8 percent in 1983-84. The first-year attrition rate for women is virtually the same as for men. The attrition rate is higher for blacks than for all other freshmen; in 1983-84, blacks made up 5.3 percent of the freshman class but 14.3 percent of freshman attrition. According to the ADA annual report 1984-85 in Dental Education Supplement 5, the greatest proportion of the 1983-84 freshmen withdrawals of black students were for scholastic reasons related to coursework.

The total attrition rate during four years of dental school has been increasing gradually. If one takes the 1983-84 rate of attrition as a base, the national dental school entering class can be expected to experience approximately an 11 percent attrition rate by the time of graduation. The comparable 1980-81 attrition rate was 8.4 percent.

Student Indebtedness. Significant changes have occurred over recent years in the level of dental student indebtedness. Student indebtedness upon graduation increased from an average of $12,700 in 1978 to $32,000 in 1984. When these figures are adjusted for inflation, student indebtedness increased by 58 percent between 1978 and 1984. Over this 6-year period, there has been more than a threefold increase in the proportion of seniors graduating with $20,000 or more debt. In 1984, 81 percent of the seniors had a graduating debt of at least $20,000, and 30 percent of the seniors had indebtedness of $40,000 or more. The increase in indebtedness correlates with increases in the costs to students of dental education since the mid-1970s. Other contributing factors include higher cost of living, higher interest rates, and reduced availability of scholarships and low-cost loans. If tuitions continue to increase, it is likely that the levels of indebtedness will also continue to rise.

Practice Plans of Senior Students. The American Association of Dental Schools (AADS) 1984 survey of dental school seniors indicated that the immediate postgraduate plans for 24.8 percent of the seniors was to enter private practice as an independent dentist. This figure is about 9 percent lower than the 33.7 percent figure for the 1979 senior class. In 1979, 21.3 percent of seniors planned to be employed in a practice. This increased to 34.3 percent in 1984. The number of seniors planning to attend advanced education increased significantly between 1979 and 1984, from 16.8 percent to 23.3 percent.

When queried about their 5-year postgraduate plans, 83.7 percent of 1984 seniors reported that they planned some form of self-employed practice, up from 81.4 percent in 1980. Thus, in the long run, private practice ownership remains the most important career goal of most graduating seniors.

The immediate and 5-year plans of men and women were very similar. The one notable difference was in type of practice ownership. Women appeared more interested in some type of partnership or group arrangement than men. Men appeared more interested in solo ownership. As women begin to comprise a larger percentage of active dentists, it will be necessary to specifically analyze dental survey data by gender to determine what, if any, practice characteristics differ between men and women dentists.

Educational Institutions and Programs

Educational Costs and Revenues. Total institutional expenditures for training students at all dental schools rose from $635.5 million in 1981 to $758.4 million in 1984; when adjusted for inflation, this represented a 4.5 percent increase during the period. However, since the number of dental students has declined since 1981 (8.9 percent at public schools; 2.8 percent at private schools), the annualized per student institutional expenditure increased even more, particularly in public schools. In public dental schools, per student costs rose from $31,700 to $41,200; private school per student costs rose from $23,100 to $28,500 (Table 5-9). When adjusted for inflation, these changes represent a 13.8 and an 8.0 percent increase at public and private schools, respectively.

Between 1981 and 1984, several changes occurred affecting major sources of revenue to support dental education: student tuition and fees increased 49 percent; Federal support decreased 17 percent; State and local support increased 22 percent; and clinic income increased 34 percent.

For 1984, as a percentage of total revenues to support dental education, student tuition and fees amounted to 45 percent at private schools, but only 9 percent at public schools. The Federal revenue percentage was 10 percent at private schools, and 8 percent at public schools. The state revenue percentage was only 17 percent for private schools, but 64 percent for public schools. The percentage of total revenues from clinic incomes represented another 17 percent in private schools and 12 percent in public schools.

Tuition. As previously mentioned, student tuition and fees have continued to increase. For academic year 1984-85 the average tuition for first-year students was $6,703 for residents and $8,954 for nonresidents. In 1981-82 the average tuition was $4,742 for residents and $6,721 for nonresidents. When adjusted for inflation, the resident and nonresident tuitions increased by 24 percent and 17 percent, respectively, between 1981 and 1984. The average total undergraduate cost (tuition and fees) for all years of dental school was $34,640 for residents and $44,630 for nonresidents.

There are significant differences in average total undergraduate cost at public, private, and private State-related schools. The average total undergraduate cost for resident students in public schools was $21,171; for private schools, $56,949; and for private State-related schools, $49,100. For nonresidents, the total undergraduate cost average was $36,190 at public schools; $56,949 at private schools; and $55,803 at private State-related schools.

Number of Dental Schools. Currently there are 60 U.S. dental schools. Of 18 States that do not have dental schools, 14 have compact agreements with one or more dental schools through which a specified number of students from a State will be educated in exchange for an agreed remuneration by that State. Nine States containing dental schools also have compacts with dental schools in other States. The number of students attending schools through compact agreements fell 30 percent between 1980 and 1982.

In response to increasing institutional costs of dental education, the decreasing size of the applicant pool, and questions as to the needed supply of dentists, several private universities and State legislatures have assessed their resources, capabilities, options and obligations for maintaining their dental schools. Emory University has announced its intention to close its school of dentistry by 1988. Oral Roberts University plans to close its dental school with the graduation of the 1986 class. The State of Kentucky is still considering its options in planning future funding of its two dental schools and dental education in the State. A bill to close the dental school at the University of Colorado was prefiled with the Colorado Senate Committee on Health, Environment, Welfare and Institutions in December 1984 (subsequently defeated in February 1985).

While accurate predictions of future dental school closures or reductions in compact agreements are not possible at this time, it is evident that controlling costs of dental education, increasing revenues, and attracting qualified applicants continue to be critical matters confronting dental education.

Faculty. In academic year 1981-82 the ratio of students to clinical faculty was 5.33 to 1, the mean number of full-time equivalent biomedical and clinical faculty was 121 per school, and 45 percent of the faculty were full-time. In academic year 1983-84 the ratio of students to clinical faculty was 5.07 to 1, the mean number of full-time-equivalent biomedical and clinical faculty was 124 per school, and 44 percent of the faculty were full-time. The decrease in student to faculty ratio was a result of decreased enrollments in dental schools as well as the slight increase in faculty. The increase in faculty was within the clinical faculty, both full- and part-time. Biomedical faculty, both full-time and part-time, actually decreased.

Graduate Education/Specialization. The number of dental specialty education programs and the number of students trained have changed very little since 1981. If the current numbers of specialty programs and students are retained, and if the decrease in first-year postdoctoral enrollments continues, the result will be a proportionally greater number of specialty trained individuals in the dentist population. By the end of the century, the ratio of specialists to active dentists is expected to rise to 17.4 per 100, up from the current level of approximately 14 per 100.

In 1983 orthodontics and oral and maxillofacial surgery continued to attract the most first-year students among the specialty training programs. The number of pedodontic students decreased 22 percent since 1981, while prosthodontic students increased 16 percent, reflecting changing disease patterns and demographic shifts. Endodontics had a slight increase in the number of students, while periodontics had a slight decrease. Dental public health declined by 2 students to 20; oral pathology by 4 students to 19.

From 1973 to 1983 there was a noteworthy increase in the number of graduates from dental general practice residency programs and a concurrent very slight fluctuation in the number of dental specialty graduates. In 1973 there were 532 graduates from general practice residencies, increasing to 989 by 1983, a gain of 86 percent (Table 5-10). The graduates from the specialty programs have held at about the same numbers over the same period, with 1,272 in 1973 and 1,244 in 1983.

The American Dental Association, in its 1983 report on the future of dentistry, recommended a decrease in first-year clinical dental specialty positions in order to maintain the present ratio of specialists to generalists. In addition the ADA House of Delegates has approved new requirements for recognition of dental specialties, and imposed several moratoriums on the recognition of new specialties. During the next 10 years, the ADA will conduct a review of each dental specialty to aid in identifying the numbers and types of specialties needed to meet the oral health needs of the public most effectively.

The ADA report also recommended that all dental graduates take a 1-year postdoctoral program that includes hospital experience. Such a program would expose young dental graduates to an enriching interface with medicine and would provide a transitional clinical experience between dental school and private practice.

The existing postdoctoral program most closely meeting this recommendation is the hospital-based dental general practice residency program. Currently there are 917 first-year general practice residency positions; a three percent decline since 1981. It is postulated that this slight decline in first-year general practice residency positions is related to hospitals' reductions in support to dental programs in response to planned implementation of prospective payment systems.

A 1981 AADS survey of dental seniors reported that 57 percent of the graduating students indicated a need for additional training. Approximately 75 percent of the respondents thought the present general practice residency could provide the additional experience. Applying those percentages to the class of 1983 (5,756 graduates) a need for 2,460 positions for residency training could be inferred. Meeting such a need would require the creation of 1,543 additional positions in hospital residency programs or similar postgraduate education programs.

Dental Auxiliaries

About 96.4 percent of dentists who own or share in the ownership of a dental practice (independent dentists) employed at least some dental auxiliary personnel on a full- or part-time basis (Table 5-11). Of these dentists, 53.9 percent employed at least one full- or part-time dental hygienist, a 3.2 percent increase since 1981. About 88.2 percent employed at least one chairside assistant full- or part-time, a 1.0 percent increase since 1981. Only a few dentists, 7.5 percent, directly employ a dental laboratory technician.

Dental Hygienists. Since the last Report to Congress on the Status of the Health Professions the number of dental hygiene programs has remained at 201. However, the number of first-year students has continued to fall, continuing the downward trend that began in 1977. Overall there has been an 8.5 percent decline in dental hygienist first-year enrollment since 1977. For academic year 1983/84 first-year enrollment of dental hygienists was 5,117. This maintains an approximate one-to-one ratio with first-year enrolled dental students. As of the end of 1984, there were an estimated 45,800 active dental hygienists and the number per 100 active dentists was 33.2 (Table 5-12).

Only a small percentage (7.2 percent) of dental hygienists work outside traditional private practice settings. There appears to be increasing interest within the dental hygiene profession for additional practice opportunities and roles in the delivery of care to special populations, such as the homebound, hospitalized patients, and individuals in nursing homes, day care centers, and elementary and secondary schools.

Dental Assistants. The number of dental assisting programs accredited by the Commission on Dental Accreditation was 281 in 1983, a decrease of 12 since 1981. In 1983 the procedure for reporting the number of first-year enrollments in dental auxiliary programs was changed with regard to persons trained in the Armed Forces. This change resulted in an increase in enrollment. Otherwise first-year dental assistant enrollments would have continued their downward trend. The 1983 enrollment of 7,912 students is 5.6 percent less than the 1979 enrollment high of 8,386.

A large proportion of dental assistants have been trained on the job by their dentist-employers. The number of active dental assistants in 1984 (including both graduates of accredited programs and those trained on the job) is estimated to be 168,300, for a ratio of active assistants to active dentists of 122 per 100 (Table 5-13).

Dental Laboratory Technicians. The number of accredited dental laboratory technician training programs remains unchanged at 58. However, first-year enrollment has declined over 9 percent since 1981 to the 1983 level of

1,508. Traditionally, dental laboratory technicians have been trained on the job, and this form of training remains the predominant method.

Most laboratory technicians are employed in commercial dental laboratories and work in response to a written prescription or work order from a licensed dentist. The estimated number of dental technicians is 59,200, yielding a ratio of 43 technicians per 100 dentists (Table 5-14).

Six States allow denturists to provide denture service directly to the public. Maine, Colorado, and Arizona require that the denturist work under the supervision of a dentist; in Oregon, Idaho, and Montana denturists can work independently. According to the American Dental Association in 1984, there were 29 licensed denturists in Arizona, 39 in Idaho, and 115 in Oregon. Montana has licensed 12 denturists since its law was passed in 1984 and Maine has no licensed denturist. The State of Colorado statute does not require the licensure of denturists.

Dentist Supply Forecasts

The number of active dentists is expected to rise substantially in the coming years. Because future levels of supply depend mainly on future enrollment levels in the dental schools and because of the uncertainties surrounding future enrollments, this report presents three different projections of the supply of active dentists to the year 2000, using different assumptions about the number of new graduates over the projection period.

Each projection series assumes that the proportion of female students will continue to increase steadily during the next 10 years, but at about half the rate of the last 5 years. First-year enrollment of women in dental schools, which amounted to 27 percent of all first-year enrollment in 1984-85, is projected to increase gradually to 37 percent by 1994-95 and remain at that level for the rest of the projection period.

Basic Series. Decreases in first-year enrollments have been observed in dental schools for the last several academic years. The basic (or most likely) estimate of the future supply of dentists assumes that the number of first-year students will continue to decrease during the next 5 years at slightly more than half the rate of the last 5 years. Under this assumption, first-year students are projected to drop from the 5,047 in 1984-85 to 4,420 in 1989-90 and continue at that level through the rest of the century (Table 5-15). This decline would occur primarily but not exclusively as a result of a continued drop in the number of applicants to dental schools, the increasing costs to the student for a dental education, increasing national emphasis on alternative occupations within other science based occupations and reductions in the size of post baby boom cohorts.

Accordingly, the number of active dentists is projected to grow from 137,950 in 1984 to 161,180 in 2000, a net increase of approximately 23,000 dentists (Table 5-16). The growth in dentist supply relative to population is expected to continue during the remainder of the 1980s, then stabilize during the following decade. The ratio of active dentists to population would thus increase from 58 per 100,000 in 1984 to 60 in 1990, and remain at that level to the end of the century.

Because of the relatively few female dentists in the present supply, losses during the projection period due to death and retirement will consist largely of males, and future male graduates will be primarily replacing those losses. New female graduates are expected to contribute heavily to the increase in dentist supply accounting for 80 percent of the projected growth between 1984 and 2000. In the basic projection series, the number of women active in dentistry is projected to grow from about 7,000 in 1984, to 13,600 in 1990, and to 25,500 in 2000 (Table 5-17). The number of men active in the field is expected to grow more modestly, from 131,000 in 1984 to 135,700 by 2000. In 1984 women constituted only 5 percent of the active dentist supply, a figure that would grow to 9 percent in 1990 and 16 percent in 2000.

Low Alternative Series. A low alternative forecast of dentist supply has also been developed. In this projection, it is assumed that the number of first-year students will drop to 4,420 in 1989-90, as in the basic projection. But instead of assuming that first-year enrollments would stabilize as does the basic projection, the low projection assumes that the number of first-year students will continue to drop at a similar but slightly lower rate for another 5 years before stabilizing at 3,930 in 1994-95. In this projection, the dropping rate of return for a dental education, the rapidly increasing opportunities in other scientific fields, and the increasing cost of a dental education are potentiated by an effective implementation of Recommendation IV of the Strategic Plan of the Report of the ADA's Special Committee on the Future of Dentistry which calls for influencing the quality and quantity of the manpower supply.

In the low series the number of active dentists would rise to 158,900 in the year 2000, a ratio of 59 active dentists per 100,000 population (Table 5-18). Between 1984 and 1990 the projected increase in active dentists would slightly exceed the projected rate of increase in the population, yielding a dentist-to-population ratio of 60 in 1990. From 1990 to the end of the century, the growth in dentist supply is projected to be slightly below that of the population, yielding a lower dentist-to-population ratio of 59 in the year 2000. Nevertheless, this ratio in 2000 slightly exceeds the 1984 level of 58. In this low series, the number of active dentists by the end of the century would be 2,300 fewer or 1.4 percent less than the basic estimate.

High Alternative Series. The high alternative forecast of dentist supply simply assumes that the number of first-year students will remain constant at the 1984-85 level of about 5,050 throughout the projection period. This projection is predicated upon successful efforts by dental schools to attract, recruit and maintain present enrollment levels. On this basis the number of active dentists would reach 167,000 in the year 2000, achieving a ratio of 62 active dentists per 100,000 population. At the end of the projection period, the number of active dentists in this high alternative series exceeds the number in the basic series by 5,800 or 3.6 percent.

Economic Outlook for the Dental Sector, 1985-2000

The last long-range forecast of economic activity in the dental sector published by the U.S. Public Health service in the previous edition of this report (DHHS, BHPr, 1984) predicted a reversal of the historical trends in the growth of dental service supply relative to demand. Historically, the aggregate supply of dental services has grown faster than the aggregate demand for dental services, producing a relatively stable, or slightly declining, real price level. The previous report noted, however, that if the decline in dental school enrollment that began in 1979 were to continue in the foreseeable future, and if the rate of economic growth were to continue at a relatively slow pace compared with the trend established in the 1960s, the growth in supply would slow and fall behind the growth in demand late in the 1980s.

In revising the forecast of dental activity for the present report, account has been taken of updated long-range economic forecasts that are generally more optimistic than those that existed at the time of the previous dental forecast. Consequently, an improvement in the economic outlook for the dental sector is reported in this document. The dental sector is predicted to share in the generally improved economic outlook forecast for the Nation as a whole. The passage of time since the previous report has increased the uncertainty surrounding the emergence of trends and events that could dampen the demand for dental services in the future. Among these trends and events are the significant declines in the incidence and prevalence of dental decay in children, the increasingly encouraging reports of research findings that may eventually lead to prevention of some significant dental diseases and the uncertain impact of the rapidly expanding elderly segment of the population.

Forecast Assumptions

The economic forecasts presented below were made with the Bureau of Health Professions' Econometric Model of the Dental Sector (EMODS). The EMODS is a comprehensive representation of economic activity in the dental industry which has been described in detail elsewhere (DHEW, March 1980; Hixson, 1981). For the model to generate a forecast, it must be supplied with projected values of several explanatory (input) variables for each year of the forecast period. These variables are determined independently and are not influenced by the causal forces that are represented within the model.

Explanatory variables of the demand for dental services that must be provided are total U.S. population and the level of real per capita income for the nation. Explanatory variables of the supply of the dental services that must be provided are the rate of technological progress in the average dental practice and the number of the first-year enrollments in dental schools over the forecast period.

For the current forecast, both of the demand variables are predicted to experience moderate growth over the forecast years. The population is projected by the U.S. Bureau of the Census to grow from 230 million in 1983 to

264 million in 2000; however, the rate of growth will decline by about one-half, from 1 percent to 0.6 percent annually, during the same period.

Two scenerios for the annual growth of real income are projected. The first scenerio projects a decline from a peak of 6.9 percent in 1984 to a level of 3.0 percent in 1989, and remain at that level through the end of the century. The near-term real income projection through 1989 is based on the 1984 economic assumptions of the Congressional Budget Office. The long-term assumption about the real rate of economic growth from 1990 through the year 2000 is the current consensus of the long-range economic forecasters and is also consistent with the most recent long-range economic projections published by the U.S. Department of Commerce (Johnson and Friedenberg, 1985). The assumptions for scenerio number one differs from the assumptions made in 1984 in which real income was predicted to grow at 2 percent annually throughout the forecast period. The 1984 growth assumption was based on that issued in 1980 by the Joint Economic Committee of the U.S. Congress. The upward revision in the projected long-term economic growth rate in scenerio number one reflects a general revision of expectations about the future growth potential of the U.S. economy compared to the views that prevailed in the late 1970s.

A second scenerio was developed to demonstrate the effect on the forecast of changing the long-term economic growth assumption. The model was run using the Alternative III "pessimistic" economic assumption employed by the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program in its 1985 Annual Report. This pessimistic assumption is that the annual real economic growth rate will fall continuously after 1990 to 1.9 percent in the year 2000.

According to the research conducted to reestimate and refine the model, the rate of technological progress (i.e., growth in dentist productivity) has been slowing over the last few years from levels that were experienced during the 1960s and early 1970s (between 1.5 and 2.0 percent annually). A likely explanation for this trend is that dramatic breakthroughs in basic knowledge have not occurred recently, and much of the increases in productivity due to high-speed equipment and better use of traditional dental assistants have already been realized. This declining trend is continued for the present forecasts; the growth in productivity is allowed to decline to 0.5 percent annually where it is stabilized for the remainder of the forecast period. In the 1984 forecast, the rate of technological change was held constant after it declined to 1.0 percent annually. The new assumption therefore produces a slower rate of expansion of dental service supply capacity than the assumption of the previous forecast did.

Forecast Results

The forecasts produced by the model under both scenerios discussed above are presented in Table 5-19, which shows the near-term forecast through 1989 based on the Congressional Budget Office economic assumptions, and which contrasts the results of the two long-term forecasts for the period 1990-2000 based on the alternative long-run economic growth trends.

These forecasts should be viewed in terms of the predicted trends and turning points of important variables over the forecast period, rather than a prediction of the actual values that will be realized for those variables each year. Table 5-19 shows the forecast of total dental care spending in the economy, the forecast path of the dental care component of the consumer price index, and the average spending per dentist. All measures are in "real" terms, i.e., annual data have been adjusted for inflation by dividing by the overall consumer price index. Also, all of the forecasted variables are presented as indexes with a base year of 1974, i.e., all values equal 100.00 for the year 1974.

Total real expenditure on dental services is a direct measure of the level of economic activity in the industry, and its rate of growth is indicative of the health of the industry (Gotowka, 1985). Forecasts of the explanatory demand variables (per capita income and population) indicate that the demand for dental care will in both scenerios show a steady increase over the forecast period. The combined CBO near-term and economic forecasters long-run consensus economic assumptions contained in scenerio number one produces a long-run growth trend that is a continuation of the historical trend that has prevailed since the mid-1950s. The table below compares the forecast growth of real dental care expenditures for the period 1985-1995 with historical growth over comparable periods of time:

Period	Percent growth
1955-1965	54.93
1965-1975	58.03
1975-1985	58.27
1985-1995 forecast *	56.44
1985-1995 forecast **	48.00

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* CBO plus economic long-range forecasters (scenerio number one)

** CBO plus OASDI pessimistic forecast (scenerio number two).

Scenerio number two, i.e., the combined CBO near-term and OASDI "pessimistic" long-term assumptions, produce a 48 percent increase in dental care spending over the 1985-1995 period, which is 10 percent below the growth observed by the industry over the last ten years.

The real price of dental care is a direct indicator of how the demand for dental care will grow relative to the supply. The decade of the 1970s was characterized by a general decline in the real price of dental services. This extended downward trend in real dental prices during the 1970's indicated that the supply of dental services (and of dentists) was growing, on the average, faster than the demand for those services over the decade. A reversal of the trend of declining real dental prices occurred in 1981, and the dental component of the consumer price index has continued to increase at about twice the rate of the overall index ever since. The forecast resulting from scenerio number one, if its assumptions prove to be reasonably accurate, indicates that the increase in relative prices will continue as the demand for dental services grows relative to the supply for the remainder of the century. Under scenerio number two, the OASDI "pessimistic" long-run assumption, a deceleration of the increase of dental prices will be seen during the decade of the 1990s.

The prediction that the future growth of total demand for dental services will exceed the growth of total supply rests on two key assumptions discussed above. These are the assumption about economic growth, which is the key ingredient in the prosperity of the dental sector, and the assumption that growth in dentist productivity has slowed from the high historical levels of the 1970s to a rate which will average 0.5 per cent annually. Variation of the other assumptions (i.e., those regarding the rate of population growth, changes in dental school enrollments, and the growth of third-party coverage for dental care) within reasonable limits do not significantly affect the forecasts either quantitatively or qualitatively.

The implication of the long-run economic outlook for the dental sector from the viewpoint of practicing dentists is shown in Table 5-19 by the forecast trend of real expenditure per dentist, which increase under both the optimistic economic forecasters consensus forecast and the OASDI "pessimistic" assumption.

Uncertainties Underlying the Forecast

Under both scenerios the forecast is for relatively faster growth of the demand for dental services than the productive capacity of the dental sector over the remainder of the century, resulting in an upward trend in real expenditures per dentist. In assessing these forecasts, however, the reader must be cognizant of the uncertainties of the forecasts' basic assumption of sustained economic growth throughout the remainder of the century, as well as the uncertainty of its implicit assumption that the environmental conditions sustaining the dental industry will continue unchanged.

Earlier and more recent studies, including those by De Paola et al. (1981) in Massachusetts, the North Carolina Dental Manpower Project (Bowden and De Friese, 1981), and the National Institute of Dental Research (1981), have demonstrated significant reduction in dental caries in children in the United States. Although variations still exist by age, sex, race, and location, the prevalence of decay is lower by as much as 50 percent. In a study of a large sample of children performed by the National Institute of Dental Research, 36.6 percent of children ages 6-17 were reported to be free of caries in their permanent dentition in 1979-1980. This represents slightly more than an 8 percent improvement over a similar survey performed by the National Center for Health Statistics in 1971-1974. Reductions have also been cited in England, Ireland, Scotland, Denmark, Norway, Sweden, the Netherlands, and New Zealand.

Despite these encouraging trends, however, dental caries is still present in a significant proportion of the population, increases with age, and continues to be highly prevalent among the Nation's minorities. While the dental caries status of children can be discussed with reasonable assurance of accuracy, the same cannot be said about the dental condition of adults at this time.

Major epidemiologic studies of adult populations have not been performed on a national basis in over a decade, thereby making inferences about their present conditions tenuous at best. Presently, the National Institute of Dental Research is fielding a national study of adult oral health. Results of this study are anticipated within several years. Although presently unmeasured, it can be postulated that the current middle aged cohort of Americans, who have had the benefits of modern dentistry and preventive technology, have retained more teeth in better condition than previous generations. How that generations' improved oral health will translate into need for dental care is still a matter of speculation. Perhaps even more important is the lack of knowledge about the effect of observed changes in dental disease rates on dental demand and ultimately on dental manpower requirements.

Unfortunately, the data necessary to estimate relationships between prevalence of dental disease and economic demand for dental services are not presently available. Nor is it possible at this time to quantify assumptions about the impact of reductions in disease rates on the economic demand for dental services. Consequently, considerations of possible changes in the epidemiologic environment of dentistry have not been incorporated into the dental forecasting model.

The economic model used in the current forecast demonstrates the sensitivity of the level of economic activity in the dental sector to the economic demand for dental service but not the implications for changing disease patterns. The accuracy of the forecasts is dependent on the accuracy of the prediction of demand. With underlying epidemiology unchanged, demand has, historically, been very closely related to population and income. Changing dental disease prevalence may, however, alter the historical demand relationship. Thus the lack of evidence on the question of the relation of dental demand to changing dental disease rates has created a climate of uncertainty and increasing debate about the future of the dental sector. Resolution of the issues regarding this important development must await the completion of epidemiologic, economic and behavioral research.

Summary

- The Nation's supply of active dentists has continued its upward trend to attain an all-time high of 137,950, an increase of 35 percent between 1970 and 1984. Nearly 90 percent of active dentists are in private practice.

- The number of women in the dental work force is increasing at an accelerated pace, doubling from 3,500 in 1980 to 6,980 in 1984.

- The geographic distribution of dentists continues to vary widely among States and regions. As of June 1985, there were 777 designated shortage areas for dentists. However, there has been a decrease in both the number of dental shortage areas and the number of dentists needed in those areas.

- There were an estimated 19,847 dental specialists as of the end of 1984, nearly three-fifths of whom were orthodontists or oral and maxillofacial surgeons.

- In 1983 nearly three-fourths of the Nation's private practitioners were in solo practice, 17 percent worked with one other dentist, and 9 percent practiced with more than one other dentist.

- The average number of dental patient visits per week was 61, or an annual average of about 2,900. Private dental insurance made up 45 percent of gross practice income, while government programs made up less than 5 percent. The mean net income for all independent dentists from their primary practices was $61,200.

- The number of dental school applicants has dropped drastically from 15,734 in 1975-76 to 6,499 in 1984-85. Concurrently, the percentage of applicants enrolled has increased from 37 percent to 78 percent.

- Large increases in the number of first-year dental students beginning in the 1960s peaked at 6,301 in 1978-79. Since then the number has decreased steadily every year to 5,047 in 1984-85. Total dental enrollment has decreased over the last 4 years to the present level of 20,588.

- First-year minority enrollment has more than doubled from 8.8 percent in 1971-72 to 19.7 percent in 1984-85. However, enrollment of black students has shown virtually no increase over the same period of time.

- The enrollment of women in dental schools has increased dramatically from only 2 percent of first-year enrollment in 1970-71 to 27 percent in 1984-85.

- The 5,337 dental graduates in 1984 represent an increase of 42 percent over the 1970 level. The number of graduates will decrease in the coming years because of the recent sharp drop in first-year enrollments.

- Dental student indebtedness upon graduation has increased sharply from an average of $12,700 in 1978 to $32,000 in 1984.

- Annual institutional expenditures per dental student have risen to an average of $35,400 in 1984, an increase of 27 percent since 1981.

- The estimated active supply of dental auxiliaries in 1984 includes 45,800 dental hygienists, 168,300 dental assistants, and 59,200 dental laboratory technicians.

- Under the basic projection, first-year dental students are projected to drop from the 5,047 in 1984-85 to 4,420 in 1989-90, and continue at that level through the rest of the century.

- Despite the projected decrease in first-year students, the number of active dentists is expected to grow to 161,180 in 2000, a net increase of approximately 23,000 dentists. The ratio of active dentists to population would increase from the current 58 per 100,000 to 60 by 1990 and remain at that level through 2000.

- The number of women active in dentistry is projected to reach 25,500 in 2000, more than three times the present level.

- The present forecast is for relatively faster growth of demand for dental services than the productive capacity of dental sectors over the remainder of the century.

- Significant reductions of dental caries in children have been observed over the past decade. New research is needed to assess the status of the adult population and to translate the findings into information useful for manpower planning.

Table 5-1. TOTAL AND ACTIVE DENTISTS AND DENTIST-TO-POPULATION RATIOS: SELECTED YEARS, DECEMBER 31, 1950-1984

Year	Number of dentists 1/		Total population (thousands)	Dentists per 100,000 population		Active civilian dentists 2/	Civilian population (thousands)	Active civilian dentists per 100,000 civilian population
	Total	Active		Total	Active			
1950	89,730	79,190	153,622	58.4	51.5	75,310	151,238	49.8
1955	97,960	84,370	167,513	58.5	50.4	78,270	164,597	47.6
1960	105,200	90,120	182,287	57.7	49.4	84,500	179,742	47.0
1965	112,450	95,990	195,539	57.5	49.0	89,640	192,633	46.5
1970	116,250	102,220	206,466	56.3	49.5	95,680	203,499	47.0
1975	126,590	112,020	217,095	58.3	51.6	106,740	214,957	49.7
1976	129,660	115,000	219,179	59.2	52.5	110,000	217,046	50.7
1977	132,670	117,890	221,477	59.9	53.2	112,720	219,358	51.4
1978	135,500	120,620	223,880	60.5	53.9	115,450	221,783	52.1
1979	138,450	123,500	226,444	61.1	54.5	118,330	224,367	52.7
1980	141,280	126,240	228,976	61.7	55.1	121,240	226,861	53.4
1981	144,380	129,180	231,271	62.4	55.9	124,080	229,114	54.2
1982	147,250	132,010	233,529	63.1	56.5	126,810	231,344	54.8
1983	150,320	135,120	235,671	63.8	57.3	129,920	233,473	55.6
1984	152,950	137,950	237,839	64.3	58.0	132,750	235,621	56.3

1/ Includes dentists in Federal service.

2/ Dentists in the Veterans Administration and U.S. Public Health Service are counted as civilian dentists.

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the American Dental Association, Bureau of Economic and Behavioral Research.

U.S. Bureau of the Census. Current Population Report P-25, Nos. 438, 542, 812, and 966.

Table 5-2. PRIMARY TYPE OF DENTAL EMPLOYMENT OF ACTIVE DENTISTS, BY SEX: DECEMBER 31, 1984

Primary type of dental employment	All active dentists		Male		Female	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
All active	137,950	100.0	130,970	100.0	6,980	100.0
Practicing dentist (30 or more hours per week)	106,367	77.1	102,484	78.3	3,883	55.6
Practicing dentist (Less than 30 hours per week)	15,161	11.0	13,942	10.6	1,219	17.5
On faculty or staff of dental school	3,577	2.6	3,210	2.5	367	5.2
Armed Forces dentist	5,200	3.8	4,840	3.7	360	5.2
Other Federal dentist	2,000	1.4	1,800	1.4	200	2.9
Dentist in State or local government	1,247	0.9	1,097	0.8	150	2.1
Hospital staff dentist	497	0.3	435	0.3	62	0.9
Intern or resident	2,454	1.8	1,940	1.5	514	7.4
Other student	655	0.5	540	0.4	115	1.6
Staff member of health or dental organization	792	0.6	682	0.5	110	1.6

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the American Dental Association, Bureau of Economic and Behavioral Research.

Table 5-3. NUMBER OF ACTIVE CIVILIAN DENTISTS AND DENTIST-TO-POPULATION RATIOS, BY REGION, DIVISION, AND STATE: DECEMBER 31, 1970, 1980, AND 1984

Geographic area	1970		1980		1984	
	Active civilian dentists	Active civilian dentists per 100,000 civilian population	Active civilian dentists	Active civilian dentists per 100,000 civilian population	Active civilian dentists	Active civilian dentists per 100,000 civilian population
UNITED STATES	95,680	47.0	121,240	53.5	132,750	56.3
NORTHEAST	28,601	58.9	32,536	66.2	33,675	67.5
New England	6,117	51.9	8,171	66.1	8,667	68.8
Connecticut	1,835	61.0	2,290	73.6	2,400	76.1
Maine	350	36.2	505	44.8	565	49.0
Massachusetts	3,024	52.9	4,079	71.0	4,319	74.3
New Hampshire	311	41.5	482	52.3	541	55.4
Rhode Island	425	46.9	522	55.1	512	53.2
Vermont	172	38.5	293	57.2	330	61.9
Middle Atlantic	22,484	61.1	24,365	66.2	25,008	67.1
New Jersey	4,056	57.3	4,860	65.9	5,061	67.2
New York	12,397	68.9	12,841	73.1	12,963	72.9
Pennsylvania	6,031	51.6	6,664	56.1	6,984	58.5
MIDWEST	26,129	46.3	31,036	52.7	34,061	57.5
East North Central	18,423	45.9	21,856	52.4	23,873	57.2
Illinois	5,503	50.0	6,214	54.4	6,683	58.0
Indiana	2,045	39.2	2,370	43.1	2,557	46.3
Michigan	4,285	48.1	5,085	54.9	5,583	61.3
Ohio	4,405	41.5	5,337	49.4	5,843	54.1
Wisconsin	2,185	49.6	2,850	60.5	3,207	67.0
West North Central	7,706	47.4	9,180	53.4	10,188	58.1
Iowa	1,306	46.7	1,497	51.3	1,643	56.2
Kansas	924	41.6	1,095	46.3	1,219	50.3
Minnesota	2,222	58.1	2,588	63.4	2,858	68.4
Missouri	1,983	42.3	2,404	48.8	2,677	53.4
Nebraska	809	55.0	985	62.7	1,075	67.1
North Dakota	232	38.0	302	46.2	351	51.8
South Dakota	230	34.8	309	44.7	365	52.0
SOUTH	22,025	35.3	32,095	42.6	36,470	45.5
South Atlantic	10,865	35.8	16,634	45.0	18,755	48.0
Delaware	213	38.6	261	43.8	284	46.5
District of Columbia	655	88.3	542	88.1	568	91.6
Florida	2,564	38.2	4,578	47.0	4,927	45.1
Georgia	1,351	29.4	2,142	39.2	2,492	43.0
Maryland	1,586	40.3	2,500	59.2	2,836	65.6
North Carolina	1,484	29.8	2,203	37.5	2,549	41.9
South Carolina	648	25.4	1,086	34.8	1,335	41.1
Virginia	1,770	39.4	2,549	47.6	2,905	52.0
West Virginia	594	34.0	753	38.6	859	43.8
East South Central	4,175	32.6	5,914	40.3	6,805	45.4
Alabama	1,009	29.4	1,380	35.4	1,560	39.2
Kentucky	1,129	35.2	1,584	43.2	1,863	50.7
Mississippi	608	27.9	786	31.2	866	33.4
Tennessee	1,429	36.0	2,164	47.1	2,516	53.3
West South Central	6,985	36.2	9,547	40.2	10,910	42.0
Arkansas	597	31.4	793	34.7	893	38.0
Louisiana	1,256	34.8	1,669	39.7	1,846	41.5
Oklahoma	932	36.6	1,237	40.9	1,403	42.8
Texas	4,200	37.4	5,848	41.1	6,768	42.5
WEST	18,925	54.9	25,573	59.2	28,544	61.5
Mountain	3,780	45.5	5,952	52.3	6,851	59.8
Arizona	699	38.1	1,212	44.5	1,381	45.4
Colorado	1,136	51.9	1,743	60.3	2,025	64.2
Idaho	325	44.9	476	50.4	538	53.8
Montana	311	44.3	467	59.3	517	62.8
Nevada	209	41.4	353	44.1	408	45.2
New Mexico	364	36.4	558	42.9	665	47.0
Utah	582	54.8	917	62.7	1,054	63.6
Wyoming	154	46.2	226	48.0	263	51.6
Pacific	15,145	57.9	19,621	61.7	21,693	63.9
Alaska	87	28.1	214	53.4	276	57.5
California	11,310	57.4	14,346	60.6	15,829	62.2
Hawaii	458	63.8	599	62.0	636	64.3
Oregon	1,376	65.2	1,779	67.5	1,959	73.0
Washington	1,914	57.0	2,683	64.9	2,993	69.4

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the American Dental Association, Bureau of Economic and Behavioral Research.

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Table 5-4. NUMBER OF ACTIVE DENTISTS AND DENTIST-TO-POPULATION RATIOS, BY GENERAL AND SPECIALTY PRACTICE: DECEMBER 31, 1970, 1980, AND 1984 1,2/

Type of practice	1970		1980		1984	
	Number	Dentists per 100,000 population	Number	Dentists per 100,000 population	Number	Dentists per 100,000 population
All active	102,220	49.5	126,240	55.2	137,950	58.0
General practice	92,898	45.0	109,080	47.7	118,103	49.7
All specialties	9,322	4.5	17,160	7.5	19,847	8.3
Orthodontics	3,901	1.9	6,563	2.9	6,934	2.9
Oral and maxillofacial surgery	2,189	1.1	3,960	1.7	4,480	1.9
Periodontics	932	0.5	2,242	1.0	2,762	1.1
Pedodontics	1,076	0.5	2,063	0.9	2,398	1.0
Endodontics	457	0.2	1,174	0.5	1,667	0.7
Prosthodontics	593	0.3	949	0.4	1,317	0.5
Public health dentistry	88	3/	110	0.1	146	0.1
Oral pathology	86	3/	99	3/	143	0.1

1/ Includes dentists in Federal service.

2/ All ratios are based on total population.

3/ Ratio is less than 0.05 per 100,000 population.

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the American Dental Association, Bureau of Economic and Behavioral Research.

U.S. Bureau of the Census. Current Population Report P-25, No. 966.

Table 5-5. NUMBER OF DENTAL SCHOOL APPLICANTS IN RELATION TO NUMBER OF FIRST-YEAR DENTAL STUDENTS: ACADEMIC YEARS 1960-61 THROUGH 1984-85

Academic year	Number of applicants	Number of first-year students	Number of applicants per first-year student	Percent of applicants enrolled
1960-61	6,119	3,616	1.7	59
1961-62	5,841	3,605	1.6	62
1962-63	6,566	3,680	1.8	56
1963-64	8,969	3,770	2.4	42
1964-65	9,598	3,836	2.5	40
1965-66	9,988	3,806	2.6	38
1966-67	10,177	3,942	2.6	39
1967-68	10,264	4,200	2.4	41
1968-69	9,037	4,203	2.2	46
1969-70	10,325	4,355	2.4	42
1970-71	10,413	4,565	2.3	44
1971-72	11,012	4,745	2.3	43
1972-73	13,542	5,337	2.5	39
1973-74	14,876	5,445	2.7	37
1974-75	14,970	5,617	2.7	38
1975-76	15,734	5,763	2.7	37
1976-77	14,807	5,935	2.5	40
1977-78	12,835	5,954	2.2	46
1978-79	11,753	6,301	1.9	54
1979-80	10,520	6,132	1.7	58
1980-81	9,601	6,030	1.6	63
1981-82	8,852	5,855	1.5	66
1982-83	7,724	5,498	1.4	71
1983-84	7,128	5,274	1.4	74
1984-85	6,499	5,047	1.3	78

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from American Association of Dental Schools. Applicant Analysis, 1984 Entering Class. Also prior reports for 1975 through 1983.

American Dental Association, Council on Dental Education. Analysis of Applicants to Dental School and First-Year Enrollment 1974. Supplement 7 to Annual Report on Dental Education 1974-75. Also prior annual reports.

Table 5-6. NUMBER OF DENTAL SCHOOLS, STUDENTS, AND GRADUATES: SELECTED ACADEMIC YEARS 1950-51 THROUGH 1984-85

Academic year	Number of schools	Number of students		Number of graduates
		Total	First year	
1950-51	42	11,891	3,226	2,830
1955-56	43	12,730	3,445	3,038
1960-61	47	13,580	3,616	3,290
1961-62	47	13,513	3,605	3,207
1962-63	48	13,576	3,680	3,233
1963-64	48	13,691	3,770	3,213
1964-65	49	13,876	3,836	3,181
1965-66	49	14,020	3,806	3,198
1966-67	49	14,421	3,942	3,360
1967-68	50	14,955	4,200	3,457
1968-69	52	15,408	4,203	3,433
1969-70	53	16,008	4,355	3,749
1970-71	53	16,553	4,565	3,775
1971-72	52	17,305	4,745	3,961
1972-73	56	18,376	5,337	4,230
1973-74	58	19,369	5,445	4,515
1974-75	58	20,146	5,617	4,969
1975-76	59	20,767	5,763	5,336
1976-77	59	21,013	5,935	5,177
1977-78	59	21,510	5,954	5,324
1978-79	60	22,179	6,301	5,424
1979-80	60	22,482	6,132	5,256
1980-81	60	22,842	6,030	5,550
1981-82	60	22,621	5,855	5,371
1982-83	60	22,235	5,498	5,756
1983-84	60	21,428	5,274	5,337
1984-85	60	20,588	5,047	--- 1/

1/ Data are not available at this time.

SOURCE: American Dental Association, Council on Dental Education. Dental Students' Register for each selected academic year from 1950-51 through 1966-67. Annual Report on Dental Education for all subsequent academic years.

Table 5-7. FIRST-YEAR ENROLLMENT IN SCHOOLS OF DENTISTRY IN THE UNITED STATES, BY RACIAL/ETHNIC CATEGORY: ACADEMIC YEARS 1971-72 THROUGH 1984-85 1/

		Racial/ethnic category					
Academic year	Total first-year enrollment	First-year minority enrollment	Black	Hispanic	American Indian	Asian	Other minority
	Number of students						
1971-72	4,705	412	245	40	4	112	11
1972-73	5,287	475	266	56	5	138	10
1973-74	5,389	529	273	69	12	141	34
1974-75	5,555	551	279	75	12	142	43
1975-76	5,697	637	298	75	22	186	56
1976-77	5,869	645	290	96	19	174	66
1977-78	5,890	641	296	110	10	225	2/
1978-79	6,235	681	280	122	16	263	2/
1979-80	6,066	745	274	163	19	289	2/
1980-81	5,964	772	283	160	12	317	2/
1981-82	5,789	876	299	183	21	373	2/
1982-83	5,433	879	289	187	16	387	2/
1983-84	5,207	873	276	172	19	406	2/
1984-85	4,983	981	299	200	17	465	2/
	Percent						
1971-72	100.0	8.8	5.2	0.9	0.1	2.4	0.2
1972-73	100.0	9.0	5.0	1.1	0.1	2.6	0.2
1973-74	100.0	9.8	5.1	1.3	0.2	2.6	0.6
1974-75	100.0	9.9	5.0	1.4	0.2	2.6	0.8
1975-76	100.0	11.2	5.2	1.3	0.4	3.3	1.0
1976-77	100.0	11.0	4.9	1.6	0.3	3.0	1.1
1977-78	100.0	10.9	5.0	1.9	0.2	3.8	2/
1978-79	100.0	10.9	4.5	2.0	0.3	4.2	2/
1979-80	100.0	12.3	4.5	2.7	0.3	4.8	2/
1980-81	100.0	12.9	4.7	2.7	0.2	5.3	2/
1981-82	100.0	15.1	5.2	3.1	0.4	6.4	2/
1982-83	100.0	16.2	5.3	3.4	0.3	7.1	2/
1983-84	100.0	16.8	5.3	3.3	0.4	7.8	2/
1984-85	100.0	19.7	6.0	4.0	0.3	9.3	2/

1/ Excludes students at University of Puerto Rico.

2/ The category of "Other minority" was eliminated from first-year student data for 1977-78 and subsequent years.

SOURCE: American Dental Association, Council on Dental Education. Minority Student Enrollment and Opportunities in U.S. Dental Schools, for 1971-72 and for 1972-73. Minority Report; Supplement of Annual Report on Dental Education 1973-74 through 1983-84. Annual Report on Dental Education 1984-85.

Table 5-8. FIRST-YEAR ENROLLMENT IN SCHOOLS OF DENTISTRY IN THE UNITED STATES, BY SEX: ACADEMIC YEARS 1968-69 THROUGH 1984-85

Academic year	Both sexes	Male	Female
	Number of students		
1968-69	4,203	4,157	46
1969-70	4,355	4,299	56
1970-71	4,565	4,471	94
1971-72	4,745	4,598	147
1972-73	5,337	5,113	224
1973-74	5,445	5,054	391
1974-75	5,617	4,986	631
1975-76	5,763	5,056	707
1976-77	5,935	5,133	802
1977-78	5,954	5,074	880
1978-79	6,301	5,301	1,000
1979-80	6,132	5,056	1,076
1980-81	6,030	4,836	1,194
1981-82	5,855	4,587	1,268
1982-83	5,498	4,275	1,223
1983-84	5,274	3,961	1,313
1984-85	5,047	3,678	1,369
	Percent		
1968-69	100.0	98.9	1.1
1969-70	100.0	98.7	1.3
1970-71	100.0	97.9	2.1
1971-72	100.0	96.9	3.1
1972-73	100.0	95.8	4.2
1973-74	100.0	92.8	7.2
1974-75	100.0	88.8	11.2
1975-76	100.0	87.7	12.3
1976-77	100.0	86.5	13.5
1977-78	100.0	85.2	14.8
1978-79	100.0	84.1	15.9
1979-80	100.0	82.5	17.5
1980-81	100.0	80.2	19.8
1981-82	100.0	78.3	21.7
1982-83	100.0	77.8	22.2
1983-84	100.0	75.1	24.9
1984-85	100.0	72.9	27.1

SOURCE: American Dental Association, Council on Dental Education. *Annual Report on Dental Education, 1980-81 through 1984-85*, and *Trend Analysis; Supplement to the Annual Report on Dental Education*, for 1974-75 and for 1979-80.

Table 5-9. AVERAGE ANNUAL COST TO PUBLIC AND PRIVATE DENTAL SCHOOLS PER DENTAL STUDENT: ACADEMIC YEARS 1967-68 THROUGH 1983-84

Academic year	All schools	Public schools	Private schools
		(In thousands)	
1967-68	$ 7.3	$ 8.9	$ 5.9
1968-69	8.5	10.1	6.8
1969-70	9.5	11.1	8.0
1970-71	10.3	11.7	8.8
1971-72	12.0	-[1]	-[1]
1972-73	13.4	15.9	10.9
1973-74	14.7	17.4	11.7
1974-75	16.4	19.4	13.0
1975-76	17.8	20.7	14.5
1976-77	19.8	23.1	15.9
1977-78	21.2	24.5	17.1
1978-79	22.7	26.2	18.3
1979-80	24.9	28.5	20.3
1980-81	27.9	31.7	23.1
1981-82	30.4	34.6	25.1
1982-83	32.2	36.6	26.8
1983-84	35.4	41.2	28.5

[1] Further breakdown of school costs are not available.

SOURCE: American Dental Association, Council on Dental Education. *Financial Report, Fiscal Year Ending June 30, 1984; Supplement 4 to the Annual Report on Dental Education 1984-85*. Also prior annual reports.

Table 5-10. GRADUATES OF DENTAL GENERAL PRACTICE RESIDENCIES AND DENTAL SPECIALTY PROGRAMS: SELECTED YEARS, 1973-1983

Type of graduate	Year of graduation						
	1973	1975	1977	1979	1981	1982	1983
All graduates	1,804	1,886	1,919	1,931	2,169	2,158	2,233
General practice graduates	532	641	695	817	955	946	989
Specialty graduates, total	1,272	1,245	1,224	1,114	1,214	1,212	1,244
Orthodontics	348	356	287	277	284	283	281
Oral surgery	233	216	217	213	199	224	207
Periodontics	196	192	206	159	200	189	198
Pedodontics	179	172	169	155	174	171	168
Endodontics	130	134	144	121	160	139	145
Prosthodontics	143	141	161	156	168	156	184
Oral pathology	19	17	21	26	20	25	37
Public health dentistry	24	17	19	7	9	25	21

1/ Total includes three graduates of a combined orthodontics/pedodontics program.

SOURCE: American Dental Association, Council on Dental Education. Annual Report on Advanced Dental Education, 1983-84. Also prior annual issues.

Table 5-11. PERCENT OF INDEPENDENT DENTISTS WHO EMPLOY AUXILIARIES: SELECTED YEARS 1955-1983

	Percent of dentists employing auxiliaries 1/		
Year	Dental hygienists	Dental assistants	Any type of auxiliaries 2/
1955	10.3	70.7	77.1
1961	15.0	76.7	82.6
1967	25.2	86.6	92.4
1972	36.9	90.2	93.6
1979	48.2	87.7	94.5
1981	50.7	87.2	95.5
1983	53.9	88.2	96.4

1/ Any of these employees may be either full-time or part-time.

2/ Includes dental laboratory technicians and secretary-receptionists, as well as dental hygienists and dental assistants.

SOURCE: American Dental Association, Bureau of Economic and Behavioral Research. The 1984 Survey of Dental Practice. Also prior reports of this series.

Table 5-12. ESTIMATED NUMBER OF ACTIVE DENTAL HYGIENISTS AND NUMBER PER 100 ACTIVE DENTISTS: SELECTED YEARS 1950-1984

Year	Number of active hygienists	Number per 100 active dentists
1950	3,190	4.0
1955	4,160	4.9
1960	8,800	9.8
1965	11,600	12.1
1970	15,100	14.8
1975	26,900	24.0
1976	29,740	25.9
1977	32,200	27.3
1978	33,500	27.8
1979	35,900	29.1
1980	38,400	30.4
1981	40,700	31.5
1982	43,100	32.6
1983	44,300	32.8
1984	45,800	33.2

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Table 5-13. ESTIMATED NUMBER OF ACTIVE DENTAL ASSISTANTS AND NUMBER PER 100 ACTIVE DENTISTS: SELECTED YEARS 1950-1984

Year	Number of active assistants	Number per 100 active dentists
1950	55,200	70
1955	63,250	75
1960	74,000	82
1965	87,350	91
1970	112,000	110
1975	134,400	120
1976	140,300	122
1977	144,700	123
1978	148,300	123
1979	152,000	123
1980	155,500	123
1981	158,200	122
1982	161,800	123
1983	164,700	122
1984	168,300	122

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-14. ESTIMATED NUMBER OF ACTIVE DENTAL LABORATORY TECHNICIANS AND NUMBER PER 100 ACTIVE DENTISTS: SELECTED YEARS 1950-1984

Year	Number of active technicians	Number per 100 active dentists
1950	15,000	18.9
1955	16,870	20.0
1960	19,000	21.1
1965	24,250	25.3
1970	30,670	30.0
1975	41,600	37.1
1980	52,600	40.7
1982	55,300	41.9
1984	59,200	42.9

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-15. NUMBER OF FIRST-YEAR DENTAL STUDENTS AND NUMBER OF DENTAL GRADUATES, BY SEX: PROJECTED FOR ACADEMIC YEARS 1984-85 THROUGH 1999-2000 1/

Academic year	Number of first-year students			Number of graduates		
	Total	Male	Female	Total	Male	Female
1984-85 2/	5,047	3,678	1,369	5,410	4,243	1,167
1985-86	4,870	3,500	1,370	5,080	3,950	1,130
1986-87	4,750	3,370	1,380	4,870	3,660	1,210
1987-88	4,640	3,250	1,390	4,660	3,400	1,260
1988-89	4,530	3,130	1,400	4,500	3,240	1,260
1989-90	4,420	3,010	1,410	4,390	3,120	1,270
1990-91	4,420	2,970	1,450	4,290	3,010	1,280
1991-92	4,420	2,930	1,490	4,180	2,890	1,290
1992-93	4,420	2,880	1,540	4,080	2,780	1,300
1993-94	4,420	2,840	1,580	4,080	2,750	1,330
1994-95	4,420	2,800	1,620	4,080	2,710	1,370
1995-96	4,420	2,800	1,620	4,080	2,660	1,420
1996-97	4,420	2,800	1,620	4,080	2,630	1,450
1997-98	4,420	2,800	1,620	4,080	2,590	1,490
1998-99	4,420	2,800	1,620	4,080	2,590	1,490
1999-2000	4,420	2,800	1,620	4,080	2,590	1,490

1/ The basic methodology was used for all of these projections. It is assumed that the number of first-year students will continue to decrease during the next five years at slightly more than one half the rate of the last five years, and then stabilize. It is also assumed that the proportion of female students will continue to increase gradually during the next ten years at about one half the rate of the last five years.

2/ First-year students for 1984-85 are actual figures.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-16. ANNUAL ADDITIONS AND LOSSES TO THE SUPPLY OF ACTIVE DENTISTS AND DENTIST-TO-POPULATION RATIOS: ESTIMATED 1984, AND PROJECTED 1985 THROUGH 2000

Year	Change in supply January 1 - December 31		Active dentists 2/	
	Graduate additions 1/	Losses from deaths and retirements	Number as of December 31	Ratio per 100,000 total population
1984	5,280	2,450	137,950	58.0
1985	5,350	2,530	140,770	58.7
1986	5,020	13,210		
1987	4,810			
1988	4,600			
1989	4,440			
1990	4,330		150,760	60.1
1991	4,230	14,370		
1992	4,120			
1993	4,020			
1994	4,020			
1995	4,020		156,800	60.2
1996	4,020	15,720		
1997	4,020			
1998	4,020			
1999	4,020			
2000	4,020		161,180	60.0

1/ Excludes graduates of the University of Puerto Rico.

2/ Includes dentists in Federal service; excludes dentists in U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-17. NUMBER OF ACTIVE DENTISTS, BY SEX: ESTIMATED 1984, AND PROJECTED FOR SELECTED YEARS, 1985-2000 [1]

Year	Number of active dentists	Male dentists	Female dentists	Percent female of all dentists
1984	137,950	130,970	6,980	5.1
1985	140,770	132,770	8,070	5.7
1990	150,760	137,130	13,630	9.0
1995	156,800	137,450	19,350	12.3
2000	161,180	135,660	25,520	15.8

[1] The basic methodology was used for all of these projections. Includes dentists in Federal service.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-18. NUMBER OF ACTIVE DENTISTS AND DENTIST-TO-POPULATION RATIOS: ESTIMATED 1984, AND PROJECTED FOR SELECTED YEARS, 1985-2000[1]

Year and alternative projection	Number of active dentists	Active dentists per 100,000 total population
1984	137,950	58.0
1985	140,770	58.7
Low	140,770	58.7
High	140,770	58.7
1990	150,760	60.1
Low	150,760	60.1
High	151,200	60.3
1995	156,800	60.2
Low	156,500	60.1
High	159,820	61.4
2000	161,180	60.0
Low	158,900	59.1
High	167,020	62.2

[1] The basic methodology was used for the projections shown for the years 1985 through 2000; alternative assumptions were used for the low and high projections. Includes dentists in Federal service.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 5-19. FORECAST OF ECONOMIC ACTIVITY IN THE DENTAL SECTOR, 1985-2000 [1]

YEAR	CONGRESSIONAL BUDGET OFFICE 1985-1989 Economic Assumptions				LONG-RUN ECONOMIC FORECASTERS Consensus Forecast Scenerio Number One				1985 OASDI TRUSTEES Alternative III "Pessimistic" Assumption Scenerio Number Two			
	Annual Growth Rate of GNP (%)	Real Price	Real Exp	Exp/ Dentist	Annual Growth Rate of GNP (%)	Real Price	Real Exp	Exp/ Dentist	Annual Growth Rate of GNP (%)	Real Price	Real Exp.	Exp/ Dentist
1985	3.6	99.9	163	122								
1986	3.1	101.0	170	125								
1987	3.3	102.0	178	129								
1988	3.1	103.0	187	132								
1989	3.0	105.0	195	137								
1990					3.0	106	204	141	2.9	106	203	141
1991					"	107	213	145	2.8	107	211	145
1992					"	108	223	149	2.7	108	220	148
1993					"	110	233	154	2.6	109	228	151
1994					"	111	244	160	2.5	109	236	154
1995					"	112	255	163	2.4	110	243	157
1996					"	114	267	169	2.3	111	251	160
1997					"	115	278	174	2.2	111	258	162
1998					"	117	292	180	2.1	112	265	164
1999					"	118	305	186	2.0	113	271	166
2000					"	120	319	192	1.9	113	277	168

[1] Real price, real expenditures, and real expenditure/dentist are presented as indexes with base year 1974 (i.e., 1974 = 100). "Real" denotes that the figures have been adjusted for inflation. Real dental expenditures in 1974 were $7.387 billion dollars. Real price is defined as the ratio of the dental component of the consumer price index to the overall level of the consumer price index; for the purpose of this report, the real price was standardized at 100.0 in 1974.

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Chapter 6

OPTOMETRY

Developments in Supply

Current Supply. The number of active optometrists has increased moderately in recent years, with the number of newly graduating optometrists exceeding the number of optometrists leaving the profession by 50 percent. In 1984 there were an estimated 23,600 active optometrists in the United States, of whom 22,800 were providing some form of patient care. The remainder are in teaching and research activities.

While the number of active optometrists has increased for the past two decades, the growth rate has only recently begun to outpace that of population. The ratio of active optometrists per 100,000 population increased from 8.9 in 1970 to 9.2 in 1975 and to 9.9 per 100,000 in 1984 (Table 6-1).

The effects of the G.I. Bill of the 1950s and the sudden increase in the number of optometrists graduating in the mid 1970's and subsequent years can still be seen today. Nearly 28 percent of active optometrists were between 50 and 64 years of age in 1984. More recent increases in graduates are also quite evident, as more than 30 percent of active optometrists are under age 35. Optometry is becoming increasingly populated by younger professionals, with optometrists' median age falling from 48 years in 1980 to 42 years in 1984.

Women and Minorities. Although the number of women active in optometry is small, the proportion of women in the field is expected to rise significantly in the coming years. While slightly less than 8 percent of optometrists are women, the proportion has grown substantially in recent years because of increased enrollments of women in optometry schools. Women constituted more than one-third of first-year enrollments in 1983-84, and this level of female enrollment is expected to continue.

The number of optometrists from minority groups is quite small, although the profession continues to be unusually attractive for those of Japanese or Chinese descent. In 1980 an estimated 800 active optometrists, or 3.5 percent of the total, were members of racial or ethnic minority groups, and about three-fifths of this total were of Japanese or Chinese descent. Although the number of minorities in schools of optometry has increased in recent years due to intensive recruiting efforts, the largest growth in real numbers has been among Asian-American students. In 1983 minority enrollments totaled 584, compared with 181 in 1972.

Practice Characteristics. Most optometrists work exclusively in patient care activities, and most work full-time, defined as 30 or more hours a week. By this definition, more than 90 percent of active optometrists work full-time.

It is estimated that fewer than 5 percent of active optometrists are engaged in nonpatient-care activities.

Geographic Distribution. Estimates of the current geographic distribution of optometrists as derived from the 1978 inventory of optometrists range from a high of 11.8 per 100,000 population in the West to a low of 8 per 100,000 in the South. The ratio of optometrists per 100,000 population is 11.1 for the Midwest and 9.9 for the Northeast. The States with the highest estimated ratios of optometrists per 100,000 population are Maine (16.4), Montana (15.6), and Massachusetts (15.8); those with the lowest ratios are New Jersey (5.7), Georgia (5.8) and Louisiana (5.8) (Table 6-2).

Another factor to be considered in evaluating the geographic distribution of optometrists is the similarity between some services provided by optometrists and ophthalmologists. For example, in the designation of health manpower shortage areas for vision care, the supply of both optometrists and ophthalmologists is considered since professionals in each group spend considerable portions of their time performing basic eye examinations.

Strong regional differences are evident in the distribution of optometrists and ophthalmologists and in their proportions within individual States. States in the East such as Connecticut, New York, and Maryland which normally have relatively high ratios of health professionals per population, have lower than average ratios of optometrists to population but higher than average ratios of ophthalmologists. Conversely, several rural States (e.g., Iowa, North Dakota, and South Dakota) have unusually large supplies of optometrists relative to their populations and relatively low supplies of ophthalmologists. The Northeast which has experienced the largest increase in the supply of ophthalmologists had the lowest rate of increase in the supply of optometrists.

As of March 31, 1985, 273 health manpower shortage areas with a combined population of 13.8 million persons had been designated for vision care personnel, including optometrists. Access to care by ophthalmologists and optometrists is included in the shortage area criteria.

To eliminate the difference between visits required and visits supplied in these shortage areas, an estimated 406 additional vision care practitioners would be needed, if each practitioner provided 3,000 visits. While 79 percent of the designated areas were nonmetropolitan, such areas covered only 31 percent of the population in designated areas.

Income of Optometrists

The American Optometric Association estimates that the mean net income of active optometrists in 1984 was $55,000. Optometrists in the first year of practice are estimated to have a mean net income of $27,000. This estimate increases to $42,000 by the end of the fifth year of practice. The increase of optometric mean net income was 30 percent over the 5-year period ending in 1984, having risen from $42,300 in 1979 (AOA, March 1985).

Optometric Services by Setting

While the majority of optometric practices are still private solo practices, there has been a trend toward partnerships and group optometric practices. Optometrists have been joining with other eye care professionals as well as other health professionals in multidisciplinary clinics and health maintenance organizations. A recent outgrowth of this trend is the membership of optometrists on medical staffs with appropriate clinical privileges.

According to the 1981 Annual Survey of Hospitals conducted by the American Hospital Association, 30 percent or 2,135 of the registered hospitals in the United States have one or more optometrists who provide services to outpatients or inpatients on a regular full-time schedule or intermittently. For more than 1,000 of these hospitals, optometric services are hospital based and staffed. About 200 hospitals contract for such services and more than 900 have arranged for services through another hospital or directly with providers. According to a recent survey of the American Optometric Association, the majority of members identified as affiliated with hospitals were in private or fee-for-services practice and worked part-time with hospital patients. About one half were not in private practice and were for the most part employed by either the Armed Forces, the Public Health Service, or the Veterans Administration. The proportion of these optometrists who provided service within hospitals was 75 percent, while only 11 percent receive hospital-referred patients in their offices. State hospitals are the most common non-Federal government hospitals with optometric affiliations (AOA, August 1984).

Competency Assurance

A license to practice optometry is required in all States, the District of Columbia and Puerto Rico. At the present time 46 States have either statutory requirements or board rules requiring attendance at continuing education for optometric license renewal, usually 12-18 hours a year. At least one State requires that 10 of 28 hours must be sponsored by an academic institution, with assessment by some form of examination.

The International Association of Boards of Examiners in Optometry at its 1984 Annual Meeting unanimously passed a resolution adopting a continuing optometric education information system. The purpose of the system is to improve the relevance of continuing optometric education by:

- Providing the basis for the national coordination of optometric continuing education;

- Providing data to State boards acting on behalf of the public, to more adequately assess the current level of continuing optometric education's impact on maintaining continuing competency of the practitioners in the State;

- o Allowing better educational planning in developing continuing professional education in optometry.

Educational Developments

Applicants

The number of applicants to schools and colleges of optometry, having tripled in the preceding 6 years, peaked at nearly 4,200 in 1975-76 before declining to less than 2,100 in 1981-82. In academic year 1982-83, applicants increased slightly to 2,187.

The ratio of applicants to first-year places showed a similar pattern, increasing from 1.8 in 1969-70 to nearly 4 applicants per first-year place in 1974-75. However, the ratio subsequently declined to 1.65 in academic year 1981-82. (At the same time, three new schools of optometry were established.) In 1982-83, the ratio of applicants to first-year places rose again to 1.87 because of increasing applicants and declining first-year places.

Enrollments and Graduates

In 1983-84, 15 schools and colleges of optometry enrolled 4,539 students[1], a decrease of less than 1 percent over the previous year enrollment of 4,561. The number of graduates in 1983-84 was 1,171. First-year enrollments, which stood at 1,187 in 1983-84, declined 5.2 percent from the level 3 years earlier. However, this reflects 2-year declines of 1.6 percent between 1980-81 and 1981-82 and 9.6 percent between 1981-82 and 1982-83 as well as an increase of 5.9 percent in first-year enrollments between 1982-83 and 1983-84.

Women and Minorities. Women continue to enter the profession of optometry in increasing numbers. Between 1971-72 and 1983-84, total student enrollment in optometric schools increased 47 percent, but the enrollment of women increased 1,053 percent from 112 to 1,291.[1] This represents an average annual increase of nearly 10 percent in female enrollment since the late 1970's. During the same period, the overall increase in male enrollment was only 9 percent. As a result, 28.4 percent of optometric students today are women, compared to 3.6 percent 12 years earlier. Similarly, the 285 women who graduated from optometry schools in 1983-84 constituted 24 percent of the graduating class, a proportion that is expected to increase, since women accounted for more than 34 percent of the first-year class in academic year 1983-84.

Although the number of minority students in optometry schools more than doubled during the 12 years ending in 1983-84, the number and proportion remain very low for some minority groups. While enrollment of Asian-American students increased from 117 to 293 during this period, Black students increased only from 32 to 88, those with Spanish surnames from 30 to 123, and American Indians from 2 to 18.

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[1] Data exclude Inter-American University of Puerto Rico.

School Location

The location of their school of optometry is a prime factor in determining where optometrists practice after graduation. Nearly three-fourths of optometrists under age 45 who practice in States that have optometry schools were graduated from an in-State school. The proportion of all active optometrists who graduated from schools within their State of practice is more than 93 percent in Illinois, 90 percent in Tennessee, 88 percent in Oregon, 84 percent in Pennsylvania, 82 percent in California, and 80 percent in Massachusetts.

Nearly two-fifths of the students who completed training in 1979-81 graduated from three schools: the Illinois, Pennsylvania, and Southern Colleges of Optometry. The Illinois and Pennsylvania colleges enrolled the most first-year students during these 3 years, and the Illinois College of Optometry had the most graduates (419). Among established schools, the optometric college at Ferris State graduated the fewest students (79).

Survey of Recent Optometry Graduates

A survey of optometry graduates of 1979, 1980, and 1981 conducted by the Association of Schools and Colleges of Optometry (ASCO) shows that the trend among recent graduates is in the direction of seeking self-employment. About 54 percent of all recent graduates are self-employed, 41 percent are salaried in a clinical setting, and only 5 percent are salaried in a nonclinical setting. When the data are examined by year of graduation, the proportion of self-employed practitioners increases rather sharply from the first year after graduation (44 percent) to the third year after graduation (63 percent). Conversely, the proportion of graduates in a salaried position decreases over time after graduation, in about the same proportion as the increase in the self-employed category. These survey data suggest that some graduates enter a salaried position after graduation perhaps because of educational indebtedness or inability to raise needed capital. Subsequently, they overcome such obstacles and move toward their real professional preference, self-employment (ASCO, Sept. 1983).

Another survey finding is a somewhat higher inclination of recent male graduates to enter self-employment than female graduates. Male optometrists work an average of 40 hours a week, and females average 37 hours a week.

Approximately 90 percent of the 1979-81 optometry graduates indicate general optometry as their primary type of practice, while another 8 percent reported that their primary practice was in contact lenses. Some 74 percent reported contact lens services as their secondary area of activity.

By and large, new optometry practitioners establish themselves in States in roughly the same proportion as existing practitioners. Most of the States showing the greatest increase in the number of optometrists are found in the general region of the Sun Belt, and those with the greatest decline are in the northern industrial States.

Nearly 78 percent of the recent optometry graduates successfully completed the examination for licensure sponsored by the National Board of Examiners in Optometry (NBEO) either before of after graduation. Differences in State requirements for licensure (e.g., use of the NBEO examination versus a State-sponsored examination) did not account for any significant variation in the time needed to obtain a State license.

The recent graduates took an average of 2.1 licensure examinations. An overwhelming majority (88 percent) successfully completed the requirements to practice on their first or second State attempt and ended up practicing in one of those two States. Nineteen percent of the recent optometry graduates were not successful in one or more licensure attempts for a variety of reasons. The most often stated reasons were either failure of the written or practical examination. However, 49 percent of individuals who were initially unsuccessful passed the licensure examination in a later attempt. Analysis of the data revealed that States that do not accept the NBEO for licensure purposes tend to have a higher rate of failure than those that require the National Boards.

Educational Costs

During the 4-year period ending in the 1981-82 academic year, substantial increases in the costs of optometric education took place. Optometric students' overall educational expenses, including tuition, fees, textbooks, instruments, room and board, and miscellaneous educational costs (but not total living expenses), rose to $6,810 in 1981-82 (a 70 percent increase) for resident students and $8,862 (62 percent) for nonresidents at public institutions (ASCO, Sept. 1984). At independent schools of optometry, these costs increased to $11,254 (up 73 percent) for residents and $11,921 (up 67 percent) for nonresident students.

Tuition for optometric students increased an average of 52 percent for resident students and 64 percent for nonresident students at public schools. During the same period, students at the independent colleges experienced average tuition increases of 87 percent for residents and 73 percent for nonresidents. Room and board costs also increased, an average of 74 percent at public institutions and 53 percent at independent schools. Such increases are above the rate of inflation during this period.

Most States that lack a school or college of optometry (exceptions are Wisconsin, Vermont, and the District of Columbia) contract with schools in other States to provide spaces for their students. Such arrangements may be direct or through a regional compact such as the Southern Regional Education Board (SREB) or the Western Interstate Conference on Higher Education (WICHE). A qualifying student from a State with no optometry school might be granted a sizable tuition reduction (subsidy) to attend the optometry school which has such contracts. These subsidies presently range from $3,600 to $4,400 per academic year. With few exceptions (State University of New York and University of California, Berkeley) all schools have contract arrangements, although some decline in the total number of contracts has been noted.

During the 1977-82 period increasing numbers of students sought financial assistance. Borrowing increased in the public institutions from an average of 33 percent of the student body in 1977-78 to 49 percent in 1981-82. At independent schools borrowers using institutional resources increased from 38 percent to 61 percent of the student body.

The Federal portion of such aid, principally PELL grants and Exceptional Financial Need (EFN) scholarships, continued to decline during this period and now represents a negligible amount of available support. However, State and private sector scholarships have continued to be awarded. State contract income in the category of student aid accounts for a major portion of available aid, according to reports from the schools to the Council on Optometric Education.

In general, the major source of financial assistance to students of optometry is in the form of loans. Each school or college administers loans through the institution. By far the greatest portion of these institutional loan funds comes from the Federal Government. The Health Professions Student Loan (HPSL) and the National Direct Student Loan (NDSL) have been the primary sources of institutional lending. Both represent direct Federal funds. However, the major source of HPSL revenue now comes from the revolving-fund monies being paid back to the schools by previous borrowers. The Federal government continues to be the major source for total financial assistance available. In 1981-82 Federal programs represented 97 percent of loan funds and 88 percent of aid funds available through the optometry schools.

The total available funds administered by the schools now account for less than 30 percent of the average student expenses during the academic year. Students must seek other funding sources as well as savings, work and spouse's income for the larger amount of required expenses.

A study of educational loan indebtedness at the Illinois College of Optometry indicates that the level of indebtedness among graduates (at that school) is increasing steadily. In 1981, for example, the average amount of loan indebtedness was $18,265; in 1983 the figure had risen to $24,710. In 1982, 95 percent of the graduates had educational loan indebtedness.

Training in Geriatric Optometry

The large growth of the elderly population predicted for the coming decades intensifies the need to understand the health problems associated with aging. Aging is accompanied by decreases in the body's capabilities, including decline in the acuity of senses such as vision and hearing. Impaired vision is almost universal among the elderly. This need for information and knowledge of factors governing the aging process is being met by development of a geriatric optometry curriculum for continuing professional education of practitioners. The program, whose development was funded by the Administration on Aging, was first presented in 1984 as a tutorial during national, regional, and State professional meetings of optometrists. This geriatric optometry program is being expanded and modified for use in colleges of optometry as part of the basic professional curriculum.

Projections of Future Supply

The number of optometrists is expected to increase sharply in the coming years. Three different sets of projections of the supply of active optometrists between the years 1982 and 2000 are presented here. Each rests on different assumptions regarding the number of students who will be graduated during the projection period.

Projections of enrollments and graduates of schools of optometry are critical to projection of overall supply in the profession. The basic supply projection series (the most likely of the three projections) assumes that first-year enrollment will be maintained at the level achieved in 1983-84, and that no new schools will open during the projection period. The basic series and other projection series assume that the proportion of women enrolling in schools of optometry will remain constant at the 1983-84 level.

All three sets of projections assume that the 16 schools of optometry operating in academic year 1983-84 will remain open. These include Northeastern Oklahoma State, which began classes in September 1979, and the University of Missouri at St. Louis, which began classes in September 1980. It is also assumed that these two schools will maintain their initial first-year enrollment throughout the projection period. It should be noted that graduates of the Inter-American University School of Optometry in Puerto Rico (which opened in January 1981 with an initial enrollment of 32) are not included in the future supply estimates. Evidence from other health professions shows that graduates of Puerto Rican schools tend to remain in the Commonwealth.

Basic Series. The basic series estimates assume that optometry schools will be able to maintain their 1983-84 enrollment levels. Although there has been some decline in applicants, the number of applicants continues to be substantially greater than the number of first-year admissions. This projection is predicated on maintaining present enrollments, through a combination of State, local, and other support to optometry schools. It is also assumed that tuition will cover more of total educational costs.

In the basic series, first-year enrollments are projected to remain at the 1983-84 level of 1,187. Graduates are projected to decrease from 1,089 in 1984 to 1,072 in 1985 and 970 in 1986, before increasing to 1,029 in 1987 and remaining at 1,029 for the balance of the projection period. The total addition of new graduates to the work force between 1984 and 1990, therefore, is expected to be 7,200, or about 28 percent of all active optometrists in

1990. The number of graduates produced between 1984 and 2000 is projected to be 17,560, which would account for 59 percent of the active supply of optometrists at the end of the century.

The projected average annual number of graduates during this period would be 1,029 -- nearly 60 percent greater than the average annual loss expected from death and retirement (651). The supply of active optometrists would thus increase more than 8 percent between 1984 and 1990, from 23,600 to 25,500. Growth between 1990 and 2000 would be somewhat greater, with the number of active optometrists rising to 29,700, an increase of 16 percent over the decade. The ratio of active optometrists to population, which stands at 9.9 per 100,000 in 1984, is projected to increase to 10.2 per 100,000 in 1990 and 11.1 per 100,000 in the year 2000 (Table 6-1). Because of increased enrollments of women in schools of optometry, the growth in the number and proportion of female optometrists is expected to be substantial. The number of active women optometrists is projected to increase from 1,800 or 7.6 percent of the active supply in 1984 to 3,600 or 14.1 percent of the active supply by 1990. The growth between 1990 and the end of the century will be nearly 90 percent, yielding 6,800 active female optometrists by the year 2000. By 2000, women will represent nearly 23 percent of all active optometrists (Table 6-3).

Low Alternative Series. The low alternative series assumes that the overall net decrease (5.2 percent) between 1980 and 1983 in first-year enrollment will continue to 1987. It is assumed that another 5.2 percent decrease in enrollment to 1987-88 will take place and that first-year enrollment thereafter will remain level. Thus an average decline of 1.3 percent per year from 1983 to 1987 is assumed. This series assumes that the elimination of Federal support to schools of optometry has a more prolonged effect on student enrollments. It is also assumed that the distribution by sex of first-year enrollees observed in 1983-84 will continue. Based on these assumptions, the low alternative series projects a decline in first-year enrollment from 1,187 in 1983 to 1,156 in 1985, to 1,126 in 1987, remaining at the 1987 level until 2000. In the low series, graduates are projected to decline from 1,089 in 1984, to 1,029 in 1987, to 976 in 1991, remaining at the 1991 level until the end of the century. The total number of graduates between 1984 and 2000 would be 16,900, or about 4 percent less than the basic series.

In the low series, the number of active optometrists would rise to 25,400 in 1990 and 29,100 in 2000, but would still grow faster than the population, resulting in a ratio of 10.8 optometrists per 100,000 population (Table 6-1). In 2000 there will be 6,600 women optometrists or nearly 23 percent of all active optometrists.

High Alternative Series. The high alternative series assumes that the level of increase in the first-year enrollment observed between the 1982-83 and 1983-84 academic year will continue to 1987, but at a slower pace. This series assumes enrollment maintenance, despite the loss of Federal support, through a combination of State, local, and other support to schools of optometry. It is assumed that the 5.9 percent increase in enrollment will take place over a 4-year period instead of a single year (the average annual increase in first-year enrollment is therefore assumed to be 1.5 percent). This level of increase is judged to be reasonable since it is only half the average annual enrollment increase shown by optometry schools prior to enactment of the Health Professions Educational Assistance Act of 1963. After 1987, it is assumed first-year enrollment by sex will be maintained. Therefore, the high alternative series assumes that first-year enrollment will increase from 1,187 in 1983 to 1,225 to 1985 and to 1,265 in 1987 and remain at that level through the projection period. In the high series, graduates are projected to increase from 1,089 in 1984, decline to 1,029 in 1987, and increase to 1,097 by 1991, remaining at that level to the end of the projection period. The total number of graduates between 1984 and 2000 would be 18,300 or about 5 percent more than the basic series.

According to high series estimates, the number of optometrists would rise to 25,600 in 1990 and to 30,400 in the year 2000, or to a ratio of 11.3 optometrists per 100,000 population (Table 6-1). By the end of the century, the number of women in optometry would be 7,100 or 23 percent of all active optometrists.

Future Supply/Requirements

An estimated 23,600 optometrists were practicing in 1984 with 29,700 active optometrists being projected under the basic series by the end of the century. Using the assumptions discussed below, the Bureau of Health Professions projects that requirements for optometrists will reach 30,400 by 2000, or roughly the same as the projection of supply in that year. These projections assume continuation of the current trend toward an increase in vision analyses performed by optometrists. As population and income levels increase, the number of vision analyses should continue to rise. In addition, the aging of the Nation's population and a consequent rise in vision care services is assumed to play a role in increasing requirements. Visits to both optometrists and ophthalmologists are substantially higher for persons over age 45, reflecting the onset of vision problems during middle age and the increasing severity of these conditions as individuals become more elderly. Although data on utilization of optometric services over time are severely limited, it is evident that per capita utilization has been increasing at a modest rate. Part of this increase may be attributable to rising per capita income, which permits consumers to obtain care more frequently.

The possible influence of health insurance coverage is less clear. At present, 25 percent of optometrists' patients have third-party coverage, according to a survey by the American Optometric Assocation. Visits to optometrists and ophthalmologists may receive limited coverage by Federal Government programs such as Medicare unless the visit is for refractive services only. The projections reported here are based on the pattern of optometric service utilization that has been observed in recent years and are believed to reflect the best method for estimating requirements for optometrists. However, an alternative estimate is available for purposes of comparison.

In a recent manpower study, the American Optometric Association projected that 36,000 optometrists would be required in 1990 (AOA, 1982). The study projected needs for vision care services using four sets of data: the expected prevalence of conditions requiring care, the distribution of probable treatment modes for each condition, the average time necessary to deliver the services implied by each treatment mode, and the expected need for diagnostic services by 2000. The study assumed that actual demand would be less than it would be if optometrists were to provide all primary eye and vision care. The study estimated that half of the required diagnostic services would actually be provided and that ophthalmologists and additional providers other than optometrists would provide 35 percent of primary care. In addition to clinical care, the study projected needs in the areas of administration, research, and teaching.

In contrast to the AOA study, the projection of requirements for optometrists prepared by the Bureau of Health Professions assumes continuation of the existing relationships between optometrists and ophthalmologists in the health care system and the maintenance of current roles and responsibilities for vision care services. Any change in these relationships, such as more widespread referrals among practitioners, might have direct impact upon the level of requirements. Refrowitz notes that ophthalmologists refer between 1 and 4 percent of their cases to other ophthalmologists and 9 percent to optometrists. Optometrists refer between 1 and 14 percent of their cases to ophthalmologists. These findings tend to support the contention that the flow of patients from optometry to ophthalmology exceeds the referral or return of referral patients from ophthalmology to optometry (Refrowitz, 1981).

Summary

- The number of active optometrists per 100,000 population has increased from 9 in 1970 to 10 in 1984. Although the number of graduates has increased, a high proportion of optometrists are nearing retirement age.

- The increase in women in optometry has been substantial; they now comprise one-third of optometry students. The proportion of women in the active supply is expected to triple by the end of the century.

- While the majority of optometric practices are still solo private practices, there has been movement into group practices, as well as into multidisciplinary settings and hospitals.

- The more than 4,500 students in schools of optometry are located in 13 States and Puerto Rico. Substantial increases in the cost of optometric education have taken place.

- Substantial differences in the geographic distribution of active optometrists continue to exist. New graduates distribute themselves in States in about the same proportion as existing practitioners.
- The number of active optometrists is expected to increase to nearly 30,000 by the end of the century, or more than 25 percent over today's levels. Nearly 3 of 5 persons active in optometry in 2000 will be future graduates.
- Although very difficult to define, requirements for optometrists are projected to be about equal to the supply in the field by the year 2000.

Table 6-1. NUMBER OF ACTIVE OPTOMETRISTS AND OPTOMETRIST-TO-POPULATION RATIOS: SELECTED YEARS, ESTIMATED 1970-1984, AND PROJECTED 1985-2000 [1]

Year and alternative projection	Number of active optometrists	Active optometrists per 100,000 total population [2]
1970	18,400	8.9
1975	19,900	9.2
1980	22,000	9.6
1984	23,600	9.9
1985	23,900	10.0
Low	23,900	10.0
High	23,900	10.0
1990	25,500	10.2
Low	25,400	10.1
High	25,600	10.2
1995	27,500	10.6
Low	27,100	10.4
High	27,900	10.7
2000	29,700	11.1
Low	29,100	10.8
High	30,400	11.3

[1] The basic methodology was used for the projections shown for the years 1985 through 2000; alternative assumptions were used for the low and high projections. Includes optometrists in Federal services.

[2] Ratios are based on total population, including Armed Forces overseas, as of July 1.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

U.S. Bureau of the Census. Current Population Reports, Series P-25, Nos. 952 and 959.

Table 6-2. NUMBER OF ACTIVE OPTOMETRISTS AND OPTOMETRIST-TO-POPULATION RATIOS, BY REGION, DIVISION, AND STATE: DECEMBER 31, 1970, 1980, AND 1984

Geographic area	1970		1980		1984	
	Active optom-etrists	Active optometrists per 100,000 resident population	Active optom-etrists	Active optometrists per 100,000 resident population	Active optom-etrists	Active optometrists per 100,000 resident population
UNITED STATES	18,400	8.9	22,330	9.8	23,590	9.9
NORTHEAST	4,747	9.7	4,903	9.9	4,965	9.9
New England	1,333	11.2	1,669	13.4	1,687	13.3
Connecticut	259	8.6	297	9.5	284	9.0
Maine	116	11.1	169	15.0	190	16.4
Massachusetts	718	12.6	921	16.0	922	15.8
New Hampshire	70	9.4	98	10.5	107	10.9
Rhode Island	132	13.7	130	13.7	128	13.2
Vermont	38	8.9	54	10.5	56	10.5
Middle Atlantic	3,414	9.2	3,234	8.8	3,278	8.8
New Jersey	674	9.5	451	6.1	430	5.7
New York	1,595	8.8	1,488	8.5	1,502	8.4
Pennsylvania	1,145	9.6	1,295	10.9	1,346	11.3
MIDWEST	5,869	10.3	6,427	10.9	6,619	11.1
East North Central	4,200	10.4	4,467	10.7	4,690	11.2
Illinois	1,613	14.5	1,392	12.2	1,356	11.7
Indiana	510	9.8	637	11.6	739	13.4
Michigan	707	7.9	870	9.4	959	10.5
Ohio	942	8.8	976	9.0	1,039	9.6
Wisconsin	428	9.5	592	12.5	597	12.5
West North Central	1,669	10.2	1,960	11.4	1,929	11.0
Iowa	335	11.7	385	13.2	366	12.5
Kansas	229	10.7	272	11.4	300	12.2
Minnesota	353	9.2	443	10.8	455	10.9
Missouri	431	8.9	491	10.0	445	8.8
Nebraska	155	10.1	185	11.7	184	11.4
North Dakota	72	11.3	88	13.4	85	12.3
South Dakota	94	13.5	96	14.0	94	13.3
SOUTH	4,128	6.6	5,914	7.7	6,445	8.0
South Atlantic	1,931	6.3	2,898	7.7	3,057	7.7
Delaware	35	7.3	49	8.2	50	8.1
District of Columbia	71	9.3	62	9.8	54	8.6
Florida	492	7.3	889	8.9	932	8.4
Georgia	262	5.6	310	5.6	339	5.8
Maryland	175	4.6	283	6.6	317	7.3
North Carolina	321	6.1	444	7.5	462	7.5
South Carolina	155	5.8	244	7.8	266	8.0
Virginia	273	5.8	422	7.8	440	7.8
West Virginia	147	8.6	195	10.0	197	10.0
East South Central	825	6.6	1,244	8.5	1,388	9.2
Alabama	180	5.2	261	6.7	303	7.6
Kentucky	229	7.4	306	8.4	332	8.9
Mississippi	121	5.9	176	7.0	183	7.0
Tennessee	295	7.4	501	10.9	570	12.0
West South Central	1,372	7.1	1,772	7.3	2,000	7.6
Arkansas	151	7.8	235	10.2	288	12.2
Louisiana	223	6.0	245	5.7	258	5.8
Oklahoma	247	9.3	314	10.2	352	10.6
Texas	751	6.8	978	6.7	1,102	6.9
WEST	3,656	10.5	5,086	11.6	5,561	11.8
Mountain	712	8.6	1,143	9.9	1,305	10.3
Arizona	127	7.3	254	9.2	284	9.3
Colorado	188	8.1	288	9.8	313	9.8
Idaho	86	12.6	119	12.5	129	12.8
Montana	89	12.9	123	15.5	129	15.6
Nevada	36	8.1	68	8.2	102	11.1
New Mexico	71	6.9	131	9.9	158	11.0
Utah	74	6.5	107	7.2	127	8.9
Wyoming	41	12.0	53	11.0	63	12.3
Pacific	2,947	11.1	3,943	12.2	4,256	12.4
Alaska	17	6.6	43	10.5	59	11.7
California	2,239	11.2	2,983	12.4	3,270	12.7
Hawaii	64	7.8	94	9.6	95	9.1
Oregon	272	12.8	368	13.9	364	13.5
Washington	355	10.3	455	10.9	468	10.7

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Table 6-3. NUMBER OF ACTIVE OPTOMETRISTS, BY SEX: ESTIMATED 1984, AND PROJECTED FOR SELECTED YEARS, 1985-2000 [1]

Year	Number of active optometrists	Male optom-etrists	Female optom-etrists	Percent female of all optometrists
1984	23,600	21,800	1,800	7.6
1985	23,900	21,900	2,000	8.4
1990	25,500	21,900	3,600	14.1
1995	27,500	22,200	5,300	19.3
2000	29,700	22,900	6,800	22.9

[1] The basic methodology was used for all of these projections. Includes optometrists in Federal service; excludes optometrists in U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Chapter 7

PODIATRIC MEDICINE

Although podiatric medicine has fewer practitioners than any other health profession, it plays a significant and expanding role in health care by providing the diagnosis, treatment, and prevention of abnormal conditions of the feet. Podiatrists perform surgical procedures on the foot, prescribe corrective devices, and precribe and administer drugs and physical therapy. Podiatrists are trained and licensed to deliver a wide range of services, including the medical and surgical treatment of corns, callosities, bunions, bursitis, flatfeet, diseases of the skin and nails, and foot injuries affecting bones, tendons, muscles, and joints. In addition, they serve as the entry point into the health care system for patients with systemic diseases that manifest symptoms in the feet. These patients are referred to allopathic or osteopathic physicians for treatment of the systemic disorder. Physicians, primarily general or family practitioners and orthopedic surgeons, also provide care for foot disorders. Approximately 3 percent of general and family practice visits and 22 percent of orthopedic surgery visits are for foot care (USDHHS, 1981). These physicians treat most injuries to the ankle or foot, and most cases of clubfoot, and other foot deformities.

Developments in the Practice of Podiatric Medicine

Every podiatrist is required to be licensed by the State(s) in which he or she practices. Each State establishes its own requirements for licensure and limits of practice. Practice limits vary from State to State but usually include: anatomical areas where surgery can be performed; parts of the foot that may be amputated; and rules on the uses of anesthesia and prescription drugs. The anatomical scope of practice proposed by a panel comprising leaders in the profession includes the foot, ankle, and soft tissues of the lower leg (APA/CPE, 1984).

Number and Characteristics of Podiatrists

The number of podiatrists has gradually increased since the early 1970's, when expanded enrollments in the Colleges of Podiatric Medicine, stimulated by Federal incentive programs, began to yield higher numbers of graduates. This is evident from data collected in the last three national surveys of the profession. As more podiatric medical graduates have entered practice, their median age has rapidly decreased from 51 in 1974 to 40.5 in 1983 (Table 7-1). More than one-third of podiatrists are now less than 35 years old. It is expected that the podiatric workforce will remain relatively young for the rest of this decade, with a median age of 39-40. The data for number of years the podiatrists have been in active practice also reflect this trend. The percentage of podiatrists in practice less than 10 years increased from 21.6 in 1974 to 46.3 in 1983 (APMA, 1985).

The number of women in podiatric medicine continues to be very low. Although the number of women has increased to 350 in 1983, the proportion of women in podiatric practice has declined slightly during the period from 1974 to 1983 (APMA, 1985).

Representation of women in the profession should improve in the future, because admission of women into the Colleges of Podiatric Medicine has increased significantly in the last 5 years. Women represent more than 24 percent of the first-year enrollment for academic year 1984-85.

Estimated Number of Podiatrists in the United States in 1970, 1975, and 1983.

Year	Number of Active Podiatrists	Number per 100,000 Population
1970	7,100	3.5
1975	7,300	3.4
1983	9,700[1]	4.2

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[1] Basis of estimate: 9,888 podiatrists were on the APMA roles; 9,746 surveys were deliverable; 4,876 forms (50 percent of deliverable) were returned; and 32 respondents reported they were retired. This leaves 4,844 active respondents and based on the 50 percent response rate-- 9,688 (9,700 rounded) podiatrists are estimated to have been active in December 1983. The potential for over counting and under counting exits. Some of the podiatrists for whom the survey form could not be delivered maybe active and a disproportionate number of the non-respondents may have been inactive.

SOURCES: Number of active podiatrists, 1970 and 1975, from National Center for Health Statistics data. Number of active podiatrists, 1983, from national survey data (APMA, 1985).

Number and Percentage of Active Women Podiatrists in 1970, 1974, and 1983

Year	Number of Women Podiatrists	Percent of Total Who Are Women
1970	315	4.5
1974	271	3.8
1983	350	3.6

SOURCES: Number of active podiatrists, 1970 and 1975, from National Center for Health Statistics data. Number of active podiatrists, 1983, from national survey data (APMA, 1985).

Minorities are also underrepresented in podiatric medicine, and have been throughout the history of the profession. White, non-Hispanic podiatrists represented more than 94 percent of the practitioner population in 1974 and in 1983. The proportion of black podiatrists is uncertain; two studies have yielded significantly different data. An analysis of employment data from the 1980 census (USDHHS, 1984) shows that 4.1 percent of podiatrists are black; on the other hand, a 1983 survey of podiatrists (APMA, 1985) indicated that only 1.5 percent are black (Table 7-2). A modest increase in minority representation can be expected, because the number of minorities in the colleges has increased as the result of vigorous recruitment efforts. The 1984-85 academic year enrollment includes 356 minority students, as compared to 189 five years earlier.

Geographic Distribution

Substantial differences in the national distribution of podiatrists continue to exist. Although the total number of podiatrists increased from 7,120 to 9,700 between 1974 and 1983, the geographic distribution has not improved significantly. The census division which encompasses the States of New York, New Jersey, and Pennsylvania had the highest podiatrist:population ratio in 1974 and the largest per-population increase during the next 9 years. Southern States, which continue to have the fewest podiatrists, showed the highest percent of increase. The increase in the South Atlantic Division is primarily the result of large increases in Maryland, a border State, and in Florida.

Podiatrists, like other specialized medical practitioners, must locate their practices in areas that have a population density sufficient to generate an adequate patient census. Consequently, less than 5 percent of podiatrists' offices are found in communities of fewer than 10,000 population, and 45 percent are in cities of 100,000 population or more (Table 7-3). In rural areas, general and family physicians are likely to provide some of the services that podiatrists would provide if they were available. Because podiatrists tend to locate in larger cities, a large number of counties are experiencing a shortage of podiatric care. Seventy-five percent of the 1,403 counties identified as shortage areas by BHPr are in nonmetropolitan areas (BHPr, 1984).

Distribution of Podiatrists by Census Divisions,
1974 and 1983

Census Division	Podiatrists per 100,000 Population 1974	1983	Increase	Percent Increase	States Included
United States	3.3	4.2	0.9	27	
New England	5.1	5.8	0.7	14	ME, NH, VT, MA, RI, CT
Middle Atlantic	6.0	7.3	1.3	22	NY, PA, NJ
East North Central	4.0	4.8	0.8	20	IL, IN, OH, MI, WI
West North Central	1.9	2.7	0.8	42	MN, IA, MO, ND, SD, NE, KS
South Atlantic	2.1	3.2	1.1	52	DE, MD, DC, VA, WV, SC, GA, FL
East South Central	0.8	1.3	0.5	62	KY, TN, AL, MS
West South Central	1.5	2.3	0.8	53	AR, LA, OK, TX
Mountain	2.4	3.4	1.0	42	MT, ID, WY, CO, NM, AZ, UT, NV
Pacific	3.1	4.1	1.0	32	WA, OR, CA, HI, AK

SOURCES: 1974 data for active podiatrists, from National Center for Health Statistics. 1983 data is from Profile of Podiatric Medicine - 1984 (APMA, 1985). Census estimate for July 1, 1983. Series P-25, No. 957. Bureau of Census, U.S. Department of Commerce.

A factor which has played an important role in the establishment of the present distribution patterns for podiatrists is the graduates' tendency to remain in the general area of the college where they receive their professional training. An analysis of the association between the State of primary practice by the college attended confirms the relationship between practice location and college location. Approximately two-thirds of podiatric medical graduates of New York and California colleges have remained in those States to practice. Approximately one-third of the students from the other three colleges have remained in the State where they received their professional training (Table 7-4). As more podiatrists complete residency training in States other than those in which the colleges are located, distribution patterns may be affected.

Tendency of Graduates to Remain in the
Areas of their Professional Training, by College Attended

Location of College	Percent of Graduates Practicing in the Same-- State	Census Division
Chicago, IL	22.7	39.4
Cleveland, OH	23.0	34.5
Philadelphia, PA	31.1	48.4
New York City, NY	69.0	74.1
San Francisco, CA	64.0	70.0

SOURCE: Adapted from APMA, 1985.

Because the number of Colleges of Podiatric Medicine is limited, the number of podiatrists per population to be served (4.2 per 100,000 in 1983) is low, and the nature of podiatric practice is specialized, some level of geographic maldistribution is likely to continue for the remainder of this century.

Numbers of Podiatrists, Orthopedic Surgeons, and General and Family Physicians per 100,000 Population, by Census Division

	Practitioners per 100,000 Population		
Census Division	Podiatrists (1983)	Orthopedic Surgeons (1982)	General and Family Physicians (1982)
United States	4.2	6.7	26.8
New England	5.8	8.5	19.8
Middle Atlantic	7.3	6.9	22.5
East North Central	4.8	5.7	26.1
West North Central	2.7	5.7	32.0
South Atlantic	3.2	6.6	26.0
East South Central	1.3	5.2	25.1
West South Central	2.3	5.8	25.1
Mountain	3.4	6.8	28.6
Pacific	4.1	8.6	32.1

SOURCE: Data on podiatrists from 1983 national survey (APMA, 1985); Orthopedic surgeon and general and family medicine data from AMA Annual Survey (AMA, 1984).

The correlation of the distribution of podiatrists to the distribution of orthopedic surgeons is statistically significant at the 0.05 level. This indicates that practice opportunity is generally related to population density for both podiatrists and surgical specialty practices. General and family physicians are more evenly distributed than podiatrists, with higher proportions of practitioners in typically rural areas such as the West North Central and Mountain Divisions, but this may be attributed to Federal incentives to correct uneven distribution of these practitioners. Similar incentives have not been offered to podiatrists until recently. In areas of the country that are not served by podiatrists, general and family physicians are often the primary source of foot care for residents.

Practice Characteristics

Podiatrists have traditionally been self-employed, usually in solo practice. There is a gradual trend away from solo practice as younger podiatrists more frequently elect other practice arrangements. A 1983 survey of podiatrists indicated that 71.7 percent of podiatrists were in solo practice, 12.7 percent in partnerships, and 5.4 percent, in group practice. The remaining 10.2 percent were in practice in a variety of institutional settings (APMA, 1985).

Percentage Distribution of Podiatrists, Aged 35-44,
by Principal Form of Employment and Year of Survey

Form of Employment	Percent Distribution, Year of Survey		
	1970	1974	1983
Solo Practice	86.5	75.9	70.7
Partnership and Group Practice	9.2	21.0	20.4
Salaried and Other	4.2	3.1	8.9

SOURCE: 1970 and 1974 data from Trends in the Podiatric Profession, DHEW Pub. No. (PHS) 79-1816. 1983 data from national survey (APMA, 1985).

Only 0.5 percent of the respondents in the 1983 survey reported working in a Health Maintenance Organization (HMO) or a Preferred Provider Organization (PPO) (Table 7-6). The expansion of these organizations in the current climate of cost containment is likely to have a significant impact on podiatric medical practice. In areas where HMOs and PPOs become major health care providers, podiatrists may have to participate in these groups to retain their patients who enroll in these plans, because services rendered by nonparticipating providers are usually not reimbursed. To date, HMOs and PPOs have been reluctant to admit podiatrists. The American Podiatric Medical Association is in the process of developing data to examine the cost-effectiveness of including podiatric medicine in prepaid practice arrangements.

Nearly all podiatrists treat the majority of their patients in a private office setting (Table 7-7). Podiatric practice in hospitals, however, has increased during the last 9 years, as the number of podiatrists with hospital privileges has increased: 73 percent of podiatrists have professional privileges of some type in hospitals, and surgical privileges have been extended to 58.5 percent (APMA, 1985). Nevertheless in 1983, less than 15 percent of podiatrists treated more than 5 percent of their patients in hospital settings. Most foot problems that podiatrists treat do not require hospitalization or the use of resources beyond those available in the practitioner's office.

Percentage of Podiatrists Providing Patient Care, by Treatment Setting, in 1970, 1974, and 1983

Treatment Setting	Percent of Podiatrists, Year of Survey 1970	1974	1983
Office	93.4	95.2	96.3
Hospital Inpatient	23.1	27.1	39.3
Hospital Outpatient	9.7	9.9	19.5
Nonhospital Clinic	3.6	6.7	8.2
Nursing Home	33.3	34.1	30.6
Patient's Home	35.2	24.2	21.7

SOURCES: 1970 and 1974 data from Trends in the Podiatric Profession, DHEW Pub. No. (PHS) 79-1816. 1983 data from APMA national survey (APMA, 1985).

Podiatrists who responded to the 1983 survey reported a mean of 83.7 visits for the week of November 14-19, 1983 (Table 7-8). Assuming a 47-week period of practice per year and 9,700 active podiatrists, the total annual number of visits is approximately 38 million. Applying the same methodology to data from the 1974 survey yields a total of approximately 26 million visits. The increase of 12 million visits is primarily due to the increase in practicing podiatrists (9,700 vs. 7,085) and, to a lesser extent, the increase in productivity (83.7 vs. 77 visits per week).

Podiatric patients as a group tend to be female and older than the general population (Tables 7-9 and 7-10).

Percentage of Podiatric Patients and U.S. Population, by Selected Characteristics, 1980

Characteristics	Podiatry Patients	Total U.S. Population
Age 65 or Older	31%	10%
Female	66	52

SOURCE: Adapted from Weiner and Steinwachs, 1985. Data from the National Medical Care Utilization and Expenditure Survey, 1980.

The predominance of women and older patients is explained in part by the fact that corns and callosities are more prevalent among these two groups. Corns and callosities are the ailments most frequently treated by podiatrists. Sixty-three percent of podiatrists reported more than 25 percent of their visits related to these problems (APMA, 1985). The second most frequently encountered diagnosis is onychomycosis and other nail diseases.

Hammertoes, bunions, flatfoot, and foot manifestations of systemic diseases are other examples of problems commonly treated by podiatrists. Podiatrists also treat ankle and foot injuries, clubfoot, and other deformities, but patients with these problems more frequently go to orthopedic surgeons. Professional referrals between allopathic and osteopathic physicians and podiatrists is minimal. Typically, less than 10 percent of patients seen by podiatrists are referred from physicians, and a similar proportion of patients with systemic diseases seen by podiatrists are referred to physicians (APMA, 1985). Referrals to physicians are more commonly made by younger podiatrists, by podiatrists that are on staff of hospitals, and by podiatrists who have completed residency training.

Distribution of Podiatrists' Professional Time by Activity

Activity	Percentage of Podiatrists Reporting the Specified Ranges of Time			
	None	0-5	6-25	26-100
General Practice	2.5	1.2	8.1	88.3
Surgery	16.6	13.8	50.9	18.6
Foot Orthopedics/Biomechanics	17.8	16.4	57.2	8.6
Sports Medicine	48.6	24.8	24.3	1.8

SOURCE: Adapted from APMA, 1985

Activities characterized as general practice occupy the majority of professional time for almost all podiatrists. Although an emphasis has been placed on acquiring special expertise in surgery and foot orthopedics in recent years, this specialization, for most podiatrists, means they incorporate an emphasis on surgery or foot orthopedics into their regular practice. Specialization, in the typical medical sense, is relatively rare.

The APMA-sponsored survey conducted in November 1983 provided the first national data on how podiatrists are reimbursed (Table 7-11). Respondents reported the proportion of their practice income which comes from Medicare, Medicaid, and non-Government third-party payors by marking the most appropriate range for each. Although an exact figure cannot be determined, it appears that about half of podiatrists' practice income is from self-pay, 30 percent from non-Government third-party payors, 15 percent from Medicare, and less than 5 percent from Medicaid. An analysis of the data shows that, although individual reimbursement varies widely, reimbursement was higher for podiatrists as a group who have been active for less than 10 years. Other podiatrists grouped by age showed little fluctuation in reimbursement experience. This may indicate that younger podiatrists make greater use of third party payments and provide more extensive services, including surgery.

Reimbursement Experience Reported by Podiatrists, 1983

Percent Reimbursement	Percent of Respondents Who Reported Specified Level of Reimbursement by Program: Medicare	Medicaid	Non-Government Third-Party
None	8.9	39.0	6.8
1-10	29.8	50.0	18.4
11-25	32.4	8.1	19.3
26-50	19.1	2.0	26.0
51-76	8.0	0.6	23.2
76-100	1.9	0.3	6.4

SOURCE: Adapted from APMA, 1985.

Educational Developments

Podiatric training typically requires 4 years of college preparation (Table 7-12) and 4 years of specialized training at a College of Podiatric Medicine. During the first 2 years of professional training, the student receives a thorough grounding in the basic sciences. This is followed by 2 years of clinical training focused on the diagnosis, treatment, and prevention of abnormalities of the foot and systemic diseases that have manifestations in the feet. Almost all graduates apply for the limited number of residency positions available. Only about 69 percent of graduates can pursue postgraduate training. Residency training is usually 1 year, although a limited number of 2- and 3-year programs are available. Completion of the residency provides greater access to hospital privileges, more referrals from physicians, and a more lucrative practice. The competition for these positions is intense.

Undergraduate Students

Podiatric professional training is provided by six private colleges, five of which are free-standing colleges of podiatric medicine. The sixth college was established in a health science center.

Colleges of Podiatric Medicine, Number of Students in Academic Year 1984-85, and Graduates, 1984

	Number of Students		Number of Graduates
	First Year 1984-85	Total Enrollment 1984-85	1984
California College of Podiatric Medicine	132	399	86
College of Podiatric Medicine and Surgery [a]	70	147	-
Dr. Wm. M. Scholl College of Podiatric Medicine	150	509	135
New York College of Podiatric Medicine	164	554	131
Ohio College of Podiatric Medicine	140	551	139
Pennsylvania College of Podiatric Medicine	126	456	116
Total	782	2,616	607

[a] New school; first graduating class will be in 1986.

SOURCE: Unpublished data from an annual survey of the colleges, American Association of Colleges of Podiatric Medicine, Rockville, MD 1985.

Enrollment in the Colleges of Podiatric Medicine has leveled out after a period of rapid expansion from 1964 through 1976. The fluctuation in enrollment in 1983 and 1984 was caused by an unusual enrollment situation at one of the colleges. The general upward trend from 1980 to the present was augmented in 1982 by the gradual phasing in of larger class sizes by the new College of Podiatric Medicine and Surgery, Des Moines, IA. The 782 first-year students in 1984-85 were selected from a total of 972 applicants. The ratio of 1.5 applicants per admission in 1985-86 shows improvement over the 1.3 to 1 ratio which occurred in the early 1980's. Eighty-seven percent of the 1984 first-year admissions had bachelors or higher degrees and all had at least 3 years of college.

Colleges of Podiatric Medicine,
Number of First-Year Students and Graduates for Selected Years

Academic Year	Number of First-Year Students	Number of Graduates
1963-64	209	96
1967-68	291	162
1971-72	400	286
1975-76	641	497
1979-80	718	577
1983-84	689	607

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, based on data from the American Association of Colleges of Podiatric Medicine.

Colleges of Podiatric Medicine,
Number of Colleges and First Year Students, 1980-1986

Year	Number of Colleges	Number of First Year Students
1980	5	695
1981	5	702
1982	6	724
1983	6	689
1984	6	782
1985	6	760[a]
1986	6	760[a]

[a] Estimate by Colleges of Podiatric Medicine.

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, based on data from the American Association of Colleges of Podiatric Medicine.

In 1974-75, minority students made up only about 5 percent of the total enrollment. Ten years later, the percentage has risen to 13.6 percent. The proportion of women students grew at an even faster rate, from 3 percent of total enrollment in 1974-75 to 21.8 percent in 1984-85. In academic year 1984-85, almost one-quarter of the first-year class were women (Table 7-13).

Percentage of Women and Minorities Enrolled in Colleges of Podiatric Medicine, Academic Years 1979-80 through 1984-85

Academic Year	Percent of Total Enrollment	
	Women	Minorities
1979-80	12.1	7.5
1980-81	11.9	8.4
1981-82	14.0	8.4
1982-83	16.4	10.2
1983-84	18.6	11.6
1984-85	21.8	13.6

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, based on data from the American Association of Colleges of Podiatric Medicine.

Approximately 1 out of 10 entering podiatric medical students drop out before the beginning of the second year. The 4-year attrition rate for the 1984 graduating class was 12.7 percent. Many factors, including academic and financial problems, contributed to this level of attrition. An analysis by the Association of Colleges of Podiatric Medicine (AACPM, 1985) shows that minorities (20.8 percent), women (17.2 percent), and in-State residents (17.9 percent) experience higher than average levels of attrition. More than 42 percent of the students in Colleges of Podiatric Medicine in academic year 1984-85 are from the State in which the college is located. Because the colleges, in general, do not offer reduced tuition for in-State students, geographic proximity rather than monetary consideration appears to be the major influencing factor.

The Colleges of Podiatric Medicine

The Colleges of Podiatric Medicine are charged with the basic mission of providing initial professional training for podiatrists. The colleges are involved in a wide range of other activities as well, such as: sponsoring residency training; conducting research; providing continuing education for practicing podiatrists; preventive services to the community; and foot care for individuals. The colleges, in part, because they are almost all free-standing institutions, conduct numerous other activities such as recruitment of students, arrangement and maintenance of agreements for the use of community clinical settings for teaching purposes, preparation and presentation of elective courses in related subject areas, fundraising, and student counseling.

The colleges employed a total of 249 full-time faculty in academic year 1984-85. They maintain a relatively small number of basic science faculty, who carry the bulk of the teaching load during the first 2 years of the curriculum. Clinical faculty are primarily D.P.M.s who teach and demonstrate clinical skills to third- and fourth-year students and, in some programs, to first-year residents. Although each college's facilities and curricula

Faculty in Colleges of Podiatric Medicine,
Academic Year 1984-85

Highest Degree Held	Number of Faculty Full-Time	Part-Time
D.P.M.	107	332
Ph.D.	61	23
M.D.	11	69
D.O.	33	5
Masters	18	8
Others	19	15
Total	249	452

SOURCE: Unpublished data from the American Association of Colleges of Podiatric Medicine, 1985.

differ, the training of third-year students typically is concentrated in local clinics which the college operates. Fourth-year training occurs in the local clinics and in remote locations as internship (hospital-based) or clerkship (office or clinic-based) rotations. In 1984, 843 students received clinical training in 198 off-campus clinics (AACPM, 1985). In addition, 586 students participated in office-based clinical clerkships. With the assistance of the Podiatric Medicine Training Grant Program, three grantee colleges have initiated six new clinical training sites in areas that are underserved by podiatrists. This grant program, which started in FY 1984, requires that at least four podiatric medical students be assigned to each site for a period of at least 9 months. This long-term training in areas that have shortages of podiatrists, along with recruitment of new students from these areas, is expected to help alleviate the current uneven distribution of foot care providers in the United States.

Curriculum

The podiatric medical profession has been involved in an effort to identify the skills necessary for the entry-level practice of podiatric medicine. The Committee on Entry-Level Expectations (CELE) was established in 1981 to oversee the completion of this effort. With broad participation by faculty and practitioners, CELE developed a list of professional tasks that all new podiatrists must be able to perform. The next step was to develop educational objectives that encompass all of the practice tasks. Both the task index and the "Terminal Objectives" have been published and widely accepted by the profession (AACPM, 1984). The American Podiatric Medical Association (APMA) in conjunction with the AACPM and the Council on Podiatric Medical Education (CPME), has recently developed strategies to meet challenges that will face the profession in the year 2000 (APMA, 1984). The report of this effort, called Project 2000, strongly endorsed the use of the CELE tasks to standardize the entry-level competencies. The colleges are in the process of changing their curricula and evaluation strategies to assure that all students meet the minimum requirements and that the colleges use appropriate student evaluation techniques. Project 2000 also recommended that the colleges give special attention to the subject areas of gerontology, prevention, bioethics, communication skills, and practice administration.

Educational Expense and Financial Aid

Tuition at the private nonprofit colleges of podiatric medicine for academic year 1984-85 ranged from $8,800 to $10,700. The average educational cost to the student, including annual fees, is approximately $10,000 per year-- nearly a 20 percent increase over the last 2 years. The increase in tuition and living costs has necessitated a major increase in the amount of student assistance administered by the colleges. The two major sources of financial assistance are the Guaranteed Student Loan (GSL) Program and the Health Education Assistance Loan (HEAL) Program. Use of the HEAL Program has increased dramatically as other sources have diminished or become inadequate to meet the needs of podiatric medical students. If the average financial aid per student is totaled over the last 4 academic years, it can be estimated that the typical podiatric medical graduate has a debt of $44,000 from his or her professional training. In most cases, undergraduate education is also financed, in part, by loans, making the total debt much higher. This substantial debt service requirement likely influences graduates to locate their practice in areas where they can develop an adequate patient load. Shortage areas, such as in the South, where podiatric medicine has not been highly visible, are not attractive under these economic conditions.

College-Administered Student Assistance Data,
Academic Years 1980-81 Through 1984-85

	1981-81	1981-82	1982-83	1983-84	1984-85[a]
Number of Students Receiving Aid	2,261	2,393	2,445	2,331	2,443
Percent of Enrollment	88	93	94	89	93
Total Aid (in thousands of $)	19,287	21,542	21,751	29,446	33,022
GSL (in thousands of $)	6,243	7,045	11,657	11,035	11,838
HEAL (in thousands of $)	3,035	4,455	4,344	13,185	15,662
Average Aid per Student ($)	8,530	9,000	8,900	12,600	13,500

[a] Projected.

SOURCE: Unpublished data from the Annual Survey of Colleges of Podiatric Medicine (AACPM, 1985)

Residency Training

Less than one-half of practicing podiatrists have completed residency training (Table 7-14). The age distribution of podiatrists who reported having served residencies reflects the gradual growth of programs during the last 25 years. Podiatric residency training is sponsored by hospitals that range in size from small community or specialty hospitals to Veterans Administration facilities with more than 1,000 beds. A recent study describes the average sponsor as a 290-bed hospital with an active podiatric teaching staff of 13, including 5 podiatrists who are certified by the American Board of Podiatric Surgery (CPME, 1985). First-year residencies provide additional primary care clinical training and experience in one or more disciplines such as surgery, orthopedics, and radiology; 152 residency programs in 30 states are approved to provide first-year residency training to 417 podiatrists in academic year 1984-85. Residency training capacity increased by 9 percent in 1984, but only two-thirds of the graduates could be placed in programs. Almost all graduates apply for admission to a residency program.

Podiatric Residencies,
First-Year Positions Per Graduate,
Academic Years 1981-82 Through 1984-85

	1981-82	1982-83	1983-84	1984-85
Number of Programs	128	129	137	152
Number of Approved First-Year Positions	365	372	382	417
Number of Graduates	597	599	631	607
Positions per Graduate	61	62	61	69

SOURCES: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, based on data from the American Association of Colleges of Podiatric Medicine and the Council of Podiatric Medical Education.

The profession is actively promoting the establishment of additional residency programs and has initiated a new level of postgraduate training, preceptorships, for graduates who are unsuccessful in getting residency placement. Preceptorship training is under the general supervision of the Colleges of Podiatric Medicine or existing residency programs. At this time the number of preceptorships available is minimal. The Project 2000 consensus panel recommended that an effort be made to have residency or preceptorship positions available for all graduates by the year 1990, and that when it is available, successful completion of the training should be made a requirement for permanent State licensure. Ten States already have this requirement (APMA, 1984). Current changes in reimbursement policy may shift surgery from the teaching hospitals, which conduct the residency programs, to outpatient facilities. If this occurs it may make it difficult to expand the number of residency positions in the near future. A limited number of programs now offer a second-year residency, usually with an emphasis on surgery.

Assurance of Competence

The Council on Podiatric Medical Education, formerly the Council on Podiatry Education, is the accrediting body recognized by the U.S. Department of Education. The CPME regularly reviews the Colleges of Podiatric Medicine, residency programs, and continuing education programs to assure that they meet minimal standards for each type of training. A residency review process, which includes participants from the certification boards and specialty societies for surgery and podiatric orthopedics, has recently been initiated. Members from these specialty organizations participate in the development of review criteria, onsite evaluations, and the formulation of recommendations to CPME. Residencies are evaluated in four categories: rotating podiatric residency, podiatric orthopedic residency, podiatric surgical residency (12 months), and podiatric surgical residency (24 months or more).

Increasing numbers of podiatrists are seeking certification by the American Board of Podiatric Surgery and the American Board of Podiatric Orthopedics. In 1984, 164 podiatrists were granted diplomate status in surgery and 8 in podiatric orthopedics (CPME, 1985). Based on the 1983 survey, 15.5 percent of podiatrists claim certification in surgery and 2.6 percent in podiatric orthopedics (Table 7-15).

A Look at the Future

The expanding enrollments in the Colleges of Podiatric Medicine which have characterized the last 20 years appear now to be over. The increase in the 1980's is the result of the opening of a new college in Des Moines, IA. The first class at this new school was enrolled in 1982. The first-year class size is gradually being increased until the target maximum of 90-100 students is reached in academic year 1985-86. The remaining colleges expect to enroll slightly fewer students than during their peak years. The total number of first-year students estimated by the colleges for each of the next 3 years is 760. For purposes of projecting the future supply of podiatrists in the United States, it is assumed that first-year enrollment will remain at this 760 level through 1996 and that the current attrition rate of 12.7 will remain constant. This results in an annual addition to supply 663 new podiatrists. Data on total numbers and age distribution of the podiatrists as of late 1983 (APMA, 1985) were used to establish the base population for supply projections. Each year, the projected supply was reduced by a factor which represents expected death and retirement for the distribution of ages represented in the podiatrist population that year. On this basis the ratio of podiatrists to population is projected to grow to 5.1 podiatrists per 100,000 population in 1990, and to 6.4 in 2000. In the spring of 1985, Barry University (Miami, FL) announced its intention to develop a College of Podiatric Medicine. If this effort is successful, the supply of podiatrists will be larger in the 1990's.

Supply of Active Podiatrists and Podiatrist:Population Ratios: Actual 1970, 1975, 1983; Projected 1985-2000.

Year (Dec. 31)	Number of Active Podiatrists	Active Podiatrists per 100,000 Population
1970	7,100	3.5
1975	7,300	3.4
1983	9,700	4.2
1985	10,500	4.4
1990	12,700	5.1
1995	15,000	5.8
2000	17,100	6.4

SOURCES: 1970 and 1975 data derived from National Center for Health Statistics surveys conducted in 1968 and 1974. 1983 data from APMA national survey (APMA, 1985). Projections by HRSA, BHPr. U.S. Bureau of the Census Current Population Reports, Series P-25, Nos. 704 and 937.

Some level of improvement in the supply of podiatrists has occurred in all of the census divisions. However, the geographic distribution of podiatrists has not improved appreciably in the last 9 years. The colleges have been working to influence the first practice location of graduates for a number of years through clinical training placements remote from the college and recruitment efforts in areas that are underserved. Positive results from these efforts are not assured and could not be expected to yield a demonstrable change in national figures over a short period. As the total number of podiatrists continues to grow over the next several years, competition from other podiatrists and other physicians may prove to be a stronger influence on decisions to locate practices in underserved areas than it appears to have been in the past.

The GMENAC reviewed the supply of and requirements for medical specialties in 1990. Panels of experts estimated that 64,400 family physicians and 20,100 orthopedic surgeons would be in practice in 1990 (USDHHS, 1980). These two specialties, together with general surgery and other medical specialties, provided as much as 35-40 percent of foot care services in 1977-78 (Weiner and Steinwachs, 1985).

The BHPr projects that family medicine physician supply will be approximately in balance with GMENAC requirements in 1990, and that there will be an oversupply of approximately 5,000 orthopedic surgeons. A substantial excess of general surgeons already exists, according to GMENAC (USDHHS, 1980). Competition for patients to produce practice income may cause a gradual shift of all foot care providers to areas previously lacking such services.

Requirements

The 1983 survey does confirm that the aging of Americans is having an effect on demand for podiatric services. Approximately 60 percent of podiatrists reported that patients 65 years or older made up more than 25 percent of their clients. Podiatrists reported that about 15 percent of their income now comes from Medicare. With an increase in the numbers of elderly projected and an expanding patient awareness of the role podiatrists can play in maintaining mobility, it is expected that the requirement for foot care provided by podiatrists will expand. The prevention and treatment of sports injuries have and will continue to increase the amount of foot care needed. Orthopedic surgeons and general and family practice physicians also provide a significant level of foot care services, particularly treatment of injuries and foot deformities. As increasing numbers of physicians enter practice, podiatrists will be facing increased competition. The extent to which third-party payors reimburse podiatrists for their services will be a major factor in future years as cost containment strategies continue to be implemented.

Although the 1983 survey has collected data that will be useful in updating requirement projections, an analysis of the data has not been completed. It is therefore, not possible to project requirements accurately for 1990 or later. An updated requirement projection is expected to be available for inclusion in the next Report to the President and Congress on the Status of Health Professions Personnel.

Summary

As of December 1984, there were approximately 10,100 active podiatrists in the United States. This number is projected to increase by about 400-450 each year. The rate of growth in numbers of podiatrists will be greater than the rate of population growth. The ratio of podiatrists per 100,000 population is expected to improve from 4.2 in 1983 to 5.1 in 1990. Podiatrists now entering practice are better trained than their predecessors, with almost two-thirds of graduates receiving at least 1 year of residency training. The influx of larger graduating classes in recent years has led to a steady reduction in the median age of podiatrists, which is now about 40 years of age. Women and minorities are underrepresented in this profession. Only 3.6 percent of active podiatrists are women, and less than 5 percent are minorities. However, the percentage of women and minorities in the 1984 graduating class were 21.8 and 13.6, respectively, indicating that the slow process of improving representation has begun.

In an earlier report (USDHEW, 1978), podiatric medicine was characterized as the health profession with the most serious geographic distribution problem. Although the number of podiatrists per population has improved during the last 9 years, the pattern of distribution appears essentially unchanged. A wide variation continues to exist between areas in the South, with as few as 1.3 podiatrists per 100,000, and the Northeast, where the ratio has increased to 7.3 podiatrists per 100,000 population. The place professional training is recieved, the need for sufficient patients to support a specialty practice, and the high level of debt most podiatrists have when they graduate are factors that appear to be inhibiting a more even distribution of podiatrists. During the period 1974-1983, competition among podiatrists and other foot care providers did not dissuade podiatrists from continuing to locate in the

New York, New Jersey, and Pennsylvania areas which already have the highest podiatrist:population ratio. Unless economic conditions relative to the practice of podiatric medicine change substantially, the geographic distribution of podiatrists is unlikely to change significantly in the near future.

Orthopedic surgeons, general practice and family medicine physicians, and to a lesser degree, general surgeons also provide foot care. In fact, certain types of problems such as injuries and foot deformities are treated predominantly by other physicians. Because the factors that influence the choice of a practitioner for foot care are not well understood, it is difficult to assess the requirements for podiatrists. The 1983 survey of podiatrists sponsored by the APMA provided valuable information about current practice characteristics of podiatrists. Podiatrists continue to favor solo practice (70 percent), with almost no participation in HMOs and PPOs reported. It is expected that increased numbers of podiatrists will elect to practice in these or similar organizations. Although there is a trend to develop and certify competence in specialty areas such as surgery and podiatric orthopedics, the preponderance of practice activity for almost all podiatrists continues to be general in nature. The treatment of sports injuries is still only a small part of most podiatric medical practice. More than 95 percent of patient visits occur in the podiatrist's office, where most surgical procedures are performed using local anesthesia. Almost one-third of patients seeing podiatrists are age 65 or older. Approximately one-half of a typical podiatrist's fee is reimbursed through third-party payors as follows: Medicare-(15 percent), Medicaid-(less than 5 percent), and non-Government payors-(30 percent).

Five Colleges of Podiatric Medicine graduated a total of 607 students in 1984. The sixth college will graduate its first class in 1986. When this new college reaches its planned class size, it is expected that approximately 665 podiatrists will graduate from all schools each year. The colleges are in the process of implementing a profession-wide initiative to base each college's curriculum on specific competencies that all graduates must possess to function as practicing podiatrists. An increasing number of States, now 10, are requiring podiatrists to have a year of residency training before they will approve licensure. This trend creates a problem for the profession, because there are only enough residency positions to accommodate about two-thirds of the graduates. Efforts in recent years to increase the number of residencies have met with modest success; 24 new programs and 52 new positions have been created in the last 4 years.

The supply of podiatrists will steadily increase during the next several years, reaching approximately 12,700 in 1990 and 17,100 in 2000. Although requirements for podiatrists in the future cannot be estimated adequately at this time, the demand for podiatric services has expanded in the past 9 years and can be expected to continue to expand. It is clear that even though the supply of podiatrists has expanded in all areas of the United States, many parts of the country continue to receive inadequate podiatric services.

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Table 7-1. Age Distribution of Podiatrists, November 1983

Age	Number	Percent
25-29 years	457	9.4
30-34 years	1,197	24.6
35-44 years	1,424	29.2
45-54 years	585	12.0
55-64 years	783	16.1
65-74 years	383	7.9
75-86 years	44	1.0
Total	4,873	100.0
Mean 43.18	Median 40.5	

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-2. Racial Ethnic Distribution of Podiatrists, Based on 1980 Census Data and the 1983 Survey of Podiatrists

	1980 Census Analysis		1983 Survey	
Race/Ethnic Origin	Number	Percent	Number	Percent
Total	6,740	100.0	4,848	100.0
White (Non-Hispanic)	6,361	94.4	4,684	96.6
White (Hispanic)	63	0.9	34	0.7
Black	274	4.1	73	1.5
Oriental	42	0.6	35	0.7
Other	-	-	22	0.4

SOURCES: U.S. Department of Health and Human Services. An In-Depth Examination of the 1980 Decennial Census Employment Data for Health Occupations. ODAM Report No. 16-84, 1984.

American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-3. Population Size of Podiatrists' Community of Practice, November 1983

Population Size for Community of Practice	Number	Percent
Fewer Than 2500	25	0.5
2500-9999	196	4.3
10,000-49,999	1,361	29.6
50,000-99,000	948	20.6
100,000-499,999	1,051	22.9
500,000 and Over	1,018	22.1
Total	4,599	100.0

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-4. Census Division of Primary Practice, by Location of College of Podiatric Medicine Attended, November 1983.

Census Division	San Francisco (N = 663)	Chicago (N = 1275)	Cleveland (N = 1251)	New York (N = 800)	Philadelphia (N = 810)
New England	2.6%	5.7%	8.0%	5.1%	13.8%
Middle Atlantic	2.3	7.5	18.6	74.1	48.4
East North Central	1.4	39.4	34.5	2.1	3.6
West North Central	1.8	13.6	2.2	0.8	1.6
South Atlantic	3.6	9.2	17.6	12.6	19.1
East South Central	0.3	3.7	2.4	0.4	1.7
West South Central	6.3	8.8	7.8	1.0	4.6
Mountain	11.5	4.9	2.9	1.1	2.7
Pacific	70.0	6.7	5.1	2.4	4.3
Outside U.S.	0.3	0.5	1.0	0.4	0.1

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-5. Principal Form of Employment by Age of Podiatrist, November 1983

Principal Form of Employment	Age (Percent)				
	Under 35 Years (N = 1,620)	35-44 Years (N = 1,396)	45-54 Years (N = 563)	55-64 Years (N = 751)	65 Years and Over (N = 381)
Solo Practice	60.3	70.7	76.0	79.9	81.9
Partnership	14.7	13.7	11.7	10.8	6.8
Group Practice	9.4	6.7	5.9	4.1	3.1
Salaried	10.4	6.4	4.6	3.7	5.8
Other	3.2	2.5	1.8	1.5	2.4

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-6. Podiatrists' Type of Employment, November 1983

Form of Employment	Number	Percent
Solo Practice	3,403	71.7
Partnership	602	12.7
Group Practice	257	5.4
Preferred Provider Organization	3	0.1
Federal Government	107	2.3
HMO	18	0.4
State/Local Government	12	0.3
Non-Government Institution	24	0.5
Nonprepaid Group	4	0.1
Other Podiatrist	130	2.7
Retired	32	0.7
College of Podiatric Medicine	36	0.8
Other	117	2.5
Total	4,745	100.0

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-7. Use Frequency of Practice Settings, November 1983

Practice Settings	Frequency of Use (Percent)					
	None	1-5	6-25	26-50	51-75	76-100
Private Office	4.7	1.0	.9	4.8	12.9	75.7
Hospital Inpatient	60.7	26.4	13.0	1.2	0.1	0.3
Hospital Outpatient	80.5	10.2	6.6	0.6	0.7	1.5
Nonhospital Clinic	91.8	1.6	3.4	2.0	0.4	0.8
Surgi-Center	94.7	3.0	2.2	0.0	0.0	0.0
Nursing Home	69.4	9.8	15.1	4.2	0.9	0.6
Resident Facility	97.2	0.9	1.4	0.4	0.1	0.1
Patient's Home	78.3	17.4	3.6	0.3	0.1	0.2
Other Setting	97.0	1.2	1.3	0.4	0.0	0.1
Total N = 4,596						

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

TABLE 7-8. Number of Weekly Patient Visits to Podiatrists, November 1983

Number of Patient Visits During Week	Number	Percent
0-50 Visits	1,383	30.0
51-100 Visits	1,965	42.6
101-150 Visits	902	19.6
151-200 Visits	247	5.4
More Than 200 Visits	116	2.5
Total	4,613	100.0
Mean = 83.7 patient visits		

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-9. Patient Age Distribution for Podiatrists, November 1983

Age	Percent of Patients				
	None	01-25	26-50	51-75	76-100
16 Years or Less	13.6	83.8	2.3	0.2	0.2
17 to 44 Years	6.3	62.3	25.6	4.3	1.5
45 to 64 Years	4.7	39.5	44.8	8.5	2.5
65 Years or Older	5.4	35.4	36.6	15.3	7.4

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-10. Female Patient Distribution for Podiatrists, November 1983

Percent of Female Patients	Number	Percent
0-25	50	1.1
26-35	29	0.6
36-40	41	0.9
41-45	58	1.3
46-50	148	3.2
51-55	277	6.0
56-60	911	19.7
61-65	1,239	26.8
66-70	1,128	24.4
71 and Over	735	15.9
Total	4,616	100.0

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-11. Third-Party Reimbursement Distribution for Podiatrists, November 1983

Percent Reimbursement Specified by Respondents	Source: Medicare	Medicaid	Other Third Party
Number	4,647	4,662	4,648
None	8.9%	39.0%	6.8%
1-10	29.8	50.0	18.4
11-25	32.4	8.1	19.3
26-50	19.1	2.0	26.0
51-75	8.0	0.6	23.2
76-100	1.9	0.3	6.4

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-12. Prepodiatric Education for Podiatric Students Academic Year 1984-85

Level of Prepodiatric Education	Current Class Year: 1st	2nd	3rd	4th	Total
3 Years but Less than 4	90	73	67	32	262
4 years but Less Than a Bachelor's	18	19	20	13	70
Bachelor's Degree	617	492	507	503	2,119
Masters Degree	51	24	40	32	147
Ph.D.	2	2	2	2	8
M.D.	-	1	1	-	2
A.A./A.S.	3	2	-	1	6
Other	1	-	-	1	2
Total	782	613	637	584	2,616

SOURCE: Unpublished data from the Annual Survey of Colleges of Podiatric Medicine (AACPM, 1985).

Table 7-13. Gender and Ethnic/Minority Composition of Podiatric Medicine Students, Academic Year 1984-85

Gender	Current Class Year 1st	2nd	3rd	4th	Total
Total Students	782	613	637	584	2,616
Men	590	488	504	465	2,047
Women	192	125	133	119	569
Percentage Women	29.6	20.4	20.9	20.4	21.8
Ethnic/Minority					
Total Minorities	141	73	80	62	356
Black	66	43	42	34	185
Hispanic	27	11	9	10	57
American Indian	6	2	1	2	11
Asian/Pacific Islander	40	16	27	16	99
Other	2	1	1	-	4
Percent of Total Students Who are Ethnic Minorities	18.0	11.9	12.6	10.6	13.6

SOURCE: Unpublished data from the Annual Survey of Colleges of Podiatric Medicine (AACPM, 1985).

Table 7-14. Residency Status of Podiatrists, November 1983

Residency Status	Number	Percent
Not Completed	2,663	55.4
Completed 1 Year	1,815	37.7
Completed 2 Years	309	6.4
Completed 3 Years or More	23	0.5
Total	4,810	100.0

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Table 7-15. Board Eligibility and Certification Status of Podiatrists, November 1983

Eligibility/Certification Status	Number	Percent
Neither	3,067	65.4
ABPS [a] Eligible	772	16.5
ABPS Certified	692	14.8
ABPO [b] Eligible	33	0.7
ABPO Certified	88	1.9
Certified by Both ABPS and ABPO	35	0.7
Total	4,687	100.0

[a] American Board of Podiatric Surgery.
[b] American Board of Podiatric Orthopedics.

SOURCE: American Podiatric Medical Association. Profile of Podiatric Medicine - 1984. Washington, DC, 1985.

Chapter 8

PHARMACY

Developments in Supply

Current Supply. There were an estimated 157,000 active pharmacists in the United States in 1984, an increase of 38 percent since 1970 and 69 percent since 1960 (Table 8-1). Together with the growth in the work force, the nature of pharmacy has changed in significant ways. In two decades, pharmacy has been moving from a profession largely characterized by practitioners who owned pharmacies to one whose members are often employees. Moreover, during this time pharmacy has been moving from a profession largely concerned with dispensing of prescription drugs, to one with a greater clinical focus, with emphasis on ensuring rational drug use, and minimizing adverse drug effects.

In 1984 nearly two thirds of all active pharmacists worked in community pharmacies. More than one half of this group worked in chain store pharmacies, and the rest in independent establishments. One third of all active pharmacists worked in hospitals, nursing homes, government agencies, educational institutions, or manufacturing industries.

The proportion of pharmacists working in independently owned pharmacies has decreased significantly in recent years. In 1966, more than two thirds of all pharmacists either owned or worked in independent establishments. This proportion dropped to 47 percent in 1973, and to 39 percent in 1978. At the same time, the proportion working in chain store pharmacies rose from 14 percent in 1966 to 29 percent in 1978. While no precise current data are available, based upon the 1978 inventory, it is estimated that 30 percent of pharmacists worked in independent establishments, and 33 percent in chain store pharmacies in 1984. Over the same period, the number employed by manufacturing and wholesale industries remained relatively constant.

Hospitals also have been major areas of growth in the employment of pharmacists. The number of pharmacists working in hospitals doubled in the past 11 years, from 17,000 in 1973 to an estimated 39,000 in 1984. Over the past decade, hospitals have increased their use of full-time pharmacists. In 1984 about 95 percent of all short-term general hospitals had pharmacies, up from 82 percent in 1970.

Women and Minorities. One of the most dramatic trends in the profession has been the tremendous increase in the number and percentage of women pharmacists. In 1950 only 4 percent of active pharmacists were women; by 1984 the proportion had risen to nearly 24 percent. This upward trend is expected to continue for some time, because the percentage of women enrolled in the final 3 years of study in colleges of pharmacy has steadily increased. In 1963-64, 13 percent of these students were women. By 1984-85 the proportion had risen to 54.5 percent.

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The impact of these changes is likely to be felt in all areas of pharmacy, but especially in hospitals. While female pharmacists, like male pharmacists, once were most numerous in community pharmacies, the main employment setting for women is now the hospital pharmacy. It has been estimated that women now comprise nearly two fifths of all hospital pharmacists.

According to the 1978 Inventory of Pharmacists, among pharmacists 30 years or older, the activity rate of women maintaining licenses (77 percent) is substantially lower than for men (86 percent). Women active in pharmacy also average fewer hours per week than men: 36 hours a week in contrast to 45 hours a week for men. However, there appears to be a trend toward longer weekly working hours among female pharmacists under age 30. Although 31 percent of all female pharmacists work fewer than 35 hours a week, the rate drops to 17 percent of women under age 30.

In 1984 it was estimated that there were 14,600 active minority pharmacists or 9.3 percent of total active pharmacists. This proportion has increased from 8.9 percent in 1980 and 9.1 percent in 1982. The number of active minority pharmacists in 1984 included 4,100 Blacks; 2,900 Hispanics; 7,000 Japanese, Chinese, and other Asians; 300 American Indians; and 300 members of other minority groups.

Age Distribution. The changing nature of the profession is clearly reflected in the age distribution of pharmacists among various practice settings. Among younger pharmacists, there appears to be a sharp trend away from independent pharmacies and toward chain pharmacies and hospitals. An increasingly large proportion of pharmacists employed by Federal hospitals, private hospitals, and chain pharmacies are under age 30, while the percentage of young pharmacists practicing in independent pharmacies is much lower. This underscores the general trend away from independent pharmacies.

Younger pharmacists also appear to spend more time with patients and clients, possibly because of the increased emphasis upon clinical training in pharmacy schools. In hospital pharmacies, pharmacists under age 30 spend more time in dispensing activities and in providing information to prescribers and institutional clients than pharmacists over age 30. As expected, younger hospital pharmacists compensate for the additional time in dispensing and informing activities by spending considerably less time in administrative and managerial activities.

Geographic Distribution. As estimated from the 1978 inventory of pharmacists, the 1984 regional distribution ranged from a high estimate of 77 pharmacists per 100,000 population in the Midwest to a low of 53 in the West, while the South had 67 and the Northeast 65. Among most States there is little variation in the estimated ratio of pharmacists to population; however, Nebraska and North Dakota had the highest ratios of pharmacists to population, reflecting large numbers of younger pharmacists in these States. States with the lowest ratio of pharmacists per 100,000 were Hawaii (31) and Alaska (35); neither State has a pharmacy school (Table 8-2).

As of March 31, 1985, 132 health manpower shortage areas with a population of slightly more than 1.1 million persons had been designated for pharmacists. The difference between the number of pharmacists required under the shortage area criteria and the current supply of pharmacists in these areas was 174. About 87 percent of the designated shortage areas were nonmetropolitan, which included 94 percent of the population in the designated areas.

Competency Assurance

A license to practice pharmacy is required in all States, the District of Columbia, and Puerto Rico. Thirty-three States require continuing education credits for relicensure in pharmacy. Fifty-seven percent of all outstanding licenses are represented by these 33 States. The National Association of Boards of Pharmacy is now revising its licensure examination to improve its validity and reliability. The revised examination is expected to be ready for use in all States in 1986.

Pharmacy Practice

The recent National Study of the Practice of Pharmacy conducted for the American Pharmaceutical Association described the practice of pharmacy and provided input into the setting of practice standards and the development of measures to assess professional competence. In the study, a questionnaire was mailed to a national sample of pharmacists who were asked to rate their responsibilities on three rating scales: time spent, importance, and level of judgment. The analysis identified four broad dimensions of the practice of pharmacy: general management and administration of the pharmacy; activities related to processing the prescription; patient care functions; and education of the public and health care professionals (Rosenfeld, 1978).

Analyses of these four dimensions using a time spent rating scale and the demographic data provided by the respondents indicated the following:

- There is a remarkable consistency in the way pharmacists across the nine census regions of the United States spend their time.

- The differences that do occur (and these are not major differences) are associated with practice setting and the number of years an individual has been practicing pharmacy.

- Although all four dimensions were judged to be important aspects of the practice of pharmacy, pharmacists spend the most time on processing the prescription and patient care functions. Less time is generally spent on general management and administration of the pharmacy and education of the public and health care professionals. The amount of time spent on these two dimensions varies somewhat by practice setting and the number of years a pharmacist has been in practice.

- Responding pharmacists indicated that in the future that they expected to spend less time in processing the prescription and more time in patient care as well as education of the public and other health professionals.

Role of Pharmacists in Individual Preventive Health Care

Some 150 representatives of all disciplines of pharmacy gathered recently to discuss the trend toward more clinically oriented pharmacy practice. The group reached this consensus:

> "In this information service era, pharmacists have an important obligation to other health care professionals, patients, and the public to provide authoritative usable drug information. The provision of information should become a major focus of pharmacy practice." (ASHP, February 1985)

An accepted role of the community pharmacist in dispensing prescription medication is the prevention of adverse reactions and other therapeutic misadventures. Another dispensing activity that is gaining increasing importance is the pharmacist's preventive health role in counseling patients about self-care and the informed use of nonprescription drugs as well as nonprescription medications such as vitamin/mineral preparations and weight control products. Other areas in which pharmacists may influence individual preventive health care are hypertension screening and counseling, diabetes screening and counseling, family planning, prevention of sexually transmitted diseases, cancer prevention and detection, fluoridation counseling, and prevention of child abuse and neglect (Jinks, 1983).

Pharmacy Attention to Special Population Groups

Pharmacy education traditionally has included training to assist various groups with special medical needs, such as diabetics, hypertensives, children, and allergy sufferers. Demographic changes are now intensifying the focus on geriatrics.

The over-65 population uses more than 25 percent of all prescribed drugs. The percentage will increase as the population continues to age. Physiological changes associated with the aging process can affect drug absorption, metabolism, and excretion. Drug therapy in the elderly should be preceded by a thorough evaluation that takes all areas of physical and emotional health into consideration. Since multiple acute and chronic medical conditions are common among the elderly, thorough medical evalution often requires the services of several different kinds of health care providers, each tending to prescribe his own drug regimen. Thus, there is a great need for coordination and proper oversight. Pharmacists are especially well suited for this role. Educational programs are being introduced to prepare pharmacists to deal with specific pharmaceutically-related health needs of elderly patients.

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The response to the need for pharmacists trained in the special problems of the elderly is evidenced by the development and distribution of the comprehensive curriculum, "Pharmacy Practice for the Geriatric Patient." This curriculum is the result of 4-year joint effort by the American Association of Colleges of Pharmacy and Eli Lilly and Company. The 30-chapter text and the instructor's guide have been designed to provide all pharmacy students a core curriculum on aging and to give practicing pharmacists the opportunity to gain competence in this area through postgraduate education. Other initiatives in geriatric pharmacy have been in use for some time. They include the University of Maryland's Eldercare initiative and the Health Check Test developed by the American Pharmaceutical Association with support from Lederle Laboratories.

Educational Trends and Developments

Enrollments

While all pharmacy schools require 5 academic years of study for the baccalaureate degree and 6 years for the doctorate (Pharm.D.), the amount of preprofessional college study required varies from 2 years to none, depending on the school. Thus the enrollment data compiled by the American Association of Colleges of Pharmacy include only the final 3 years of study, which is the only period of pharmacy education common to all schools. Accordingly, discussions of new students deal with "third-to-last-year" enrollments, rather than "first-year" enrollments.

From 1965-66 through 1974-75, following the enactment of the Health Professions Educational Assistance Act of 1963, pharmacy schools experienced an average annual growth rate of nearly 9 percent in third-to-last-year enrollments. Total enrollments peaked in 1975-76 and declined 16.2 percent in the next 6 years, while third-to-last-year enrollments declined more than 20 percent (Table 8-3).

In 1984-85 the 72 colleges of pharmacy (including Puerto Rico's) enrolled 18,646 students for a first professional degree in pharmacy -- 1 percent fewer than in the previous year. Third-to-last-year enrollment in 1984-85, however, has risen over the previous year. The enrollment of 6,849 students represents an increase of 2 percent over the 1983-84 level and 4.2 percent over the third-to-last-year enrollment in 1982-83. Third-to-last-year enrollment in that year had declined by 19.2 percent from such enrollments 3 years earlier and 24.7 percent from such enrollments in 1974-75, the highest achieved.

Enrollments in pharmacy schools are substantially above the level of the late 1960s but below the peak level in 1974-75. Enrollments now appear to be stabilizing after a decline that has been taking place since the 1970s.

Women and Minorities. Despite declines in total enrollments, the number and proportion of women enrolled in pharmacy schools has continued to increase. In academic year 1984-85, the nearly 10,200 women enrolled in the final 3 years of pharmacy school represented 54.5 percent of total enrollments. The third-to-last-year class enrolled 3,793 or 55.4 percent women. In contrast, only about 20 percent of pharmacy students at the beginning of the 1970 decade were women. While growth has been relatively steady, recent trends suggest that the number of women enrolled in pharmacy schools and their proportion of the total may level off.

The proportion of American minority students enrolled in pharmacy schools has increased modestly in recent years. The proportion of black students in pharmacy schools increased from 3.7 percent of all students in 1975 to 5.6 percent in 1984. Hispanic students increased slightly from 3.8 percent of all students in 1975 to 4.1 percent in 1984. Minority students represented 16.1 percent of the total enrollments in 1984. The proportion of minorities in the third-to-last-year class paralleled total enrollment and included 429 Blacks (6.3 percent of enrollment), 390 Asian-Americans, (5.7 percent), 292 Hispanics (4.3 percent), 11 American Indians (0.2 percent), and 29 others (0.4 percent). Four predominately minority colleges -- Texas Southern, Florida A & M, Xavier, and Howard -- continue to enroll 40 percent of Black American pharmacy students. Because of only small changes in total enrollments, the number of minorities enrolled in pharmacy schools may not increase significantly in the future.

Graduates

The number of first professional degrees in pharmacy (B.S. and Pharm.D.) peaked in 1976-77 and subsequently declined 25 percent to 5,964 in 1983-84. Graduates in 1983-84 were 6 percent fewer than in the previous year. The 719 Pharm.D. degrees awarded in 1983-84 represented a slight decline from the previous year. However, students receiving the Pharm.D. as an advanced professional degree increased 11.4 percent over 1983-84. In contrast to the overall trend, women received 2,949 or 49 percent of the first professional degrees conferred in 1983-84, up from 40 percent in 1977, while minorities received 13.9 percent of the total (828 degrees), an increase of 1.8 percent since 1976-77.

Pharmacy schools in 1984 awarded 373 master's degrees, down 7.5 percent from the previous year, while Ph.D. degrees (227 in 1984) rose more than 9 percent over the previous year.

Projections of Future Supply

The number of active pharmacists is expected to rise substantially in the coming years, although supply increases may be mitigated somewhat by the increasing entry of women in the field and their tendency to work less than full-time. Future levels of supply will depend heavily upon enrollments in pharmacy schools. Three different sets of projections of the supply of active pharmacists between the years 1984 and 2000 are presented here. Each rests on different assumptions regarding the number of students who will be graduates during the projection period.

All enrollment projections assume that the 72 existing schools of pharmacy will continue to operate and do not include the Campbell University School of Pharmacy which may open in academic year 1986-87. All projections further assume that the trend toward increased enrollment of women in third-to-last-year classes will level off at the current rate of approximately 55 percent. Average completion rates for men and women entering third-to-last-year classes are expected to continue at the rates observed in recent years.

Basic Series. Projections of enrollments and graduates of schools of pharmacy are critical to projections of overall supply in the profession. The basic (or most likely) supply projection series assumes that all existing schools will remain open and that on the average they will be able to maintain the most recent enrollment levels until 1988. As stated, third-to-last-year enrollments have begun to rise from the level achieved during the period of decline ending in 1982-83. Since the percentage of female enrollments has grown relatively little in recent years, it is also assumed that female third-to-last-year enrollment will be maintained at the percent achieved during the most recent academic year. In addition, because of the demonstrated relationship between the size of the 18-22 age group and enrollment in pharmacy schools, the basic assumption is that changes in third-to-last-year enrollment beyond 1988 will be related to changes in the size of this age group (Table 8-4). This projection is predicated upon maintaining present enrollments despite the loss of Federal support, through a combination of State, local, and other support to pharmacy schools.

On this basis, the total entry of new pharmacy graduates between 1984-85 and 1999-2000 would be 88,200 new graduates or 47 percent of all pharmacists active by the end of the century. During this period, pharmacy schools would graduate 59 percent of all women pharmacists and 32 percent of all male pharmacists active in the year 2000.

With these assumptions, the total supply of active pharmacists is projected to increase from 157,000 in 1984 to 170,800 in 1990 and to 188,200 in 2000, a net increase of 31,200 during the projection period (Table 8-1). Growth in aggregate pharmacy supply would be 8.8 percent between 1984 and 1990. Between 1990 and 2000, projected growth in active supply will be 10.2 percent. The average annual growth in supply will be greater between 1984 and 1990 (1.5 percent) than between 1990 and 2000 (1.0 percent) since a somewhat higher proportion of active pharmacists are expected to retire by the end of the century. The median age of active pharmacists is expected to rise from 39 years in 1984 to 40.1 years in 1990 and to 42.7 years in 2000.

The ratio of active pharmacists per 100,000 population is projected to increase from 66.0 in 1984 to 68.4 in 1990 and 70.2 by the end of the century.

All expected growth in the active supply of pharmacists would result from substantial growth in the number of women pharmacists. The number of women active in pharmacy is projected to grow from 37,400 in 1984 to 53,000 in 1990 and to 76,100 in 2000. The number of men in the field is projected to decline from 119,600 in 1984, to 117,800 in 1990, and to 112,100 by 2000. While women constituted 24 percent of the active supply in 1984, they are projected to represent 31 percent of the active supply in 1990 and 40.4 percent by the end of the century (Table 8-5).

The effect that this increasing proportion of female pharmacists will have on the overall availability of pharmacy services cannot be predicted exactly. It is likely, however, that the number of full-time-equivalent (FTE) pharmacists will be less than the aggregate numbers imply. Although the employment participation of female pharmacists cannot be estimated precisely, the most recent data (1978 Inventory of Pharmacists) indicate that women pharmacists work 85 percent of the hours spent by the average male pharmacist. Thus, assuming that women would provide 85 percent of the FTE service of male pharmacists in any given year, the following table shows how changes in the aggegate number of pharmacists might translate into changes in full-time equivalents.

	Total active supply of pharmacists	Change during period	FTE supply of pharmacists	Change during period
1984	157,000		151,300	
1990	170,800	8.8%	162,800	7.6%
2000	188,200	10.2%	176,800	8.6%

Low Alternative Series. The low alternative series assumes that third-to-last-year enrollments will again revert back to a declining pattern. (This could be a very real possibility if the profession moves to a 6-year Pharm.D. as the sole entry-level degree.) It is assumed that enrollments will decline to one half the annual decrease in enrollments that existed between 1978 and 1982 (Table 8-3). It is assumed under this series that the elimination of Federal support to pharmacy schools would thus have a more prolonged and severe impact upon enrollments. This decline would begin in 1985 and continue to 1988 with enrollments changing in proportion to changes in the 18-22 age group from 1988 to the end of the projection period. Thus an average annual enrollment decrease of 2.9 percent per year is assumed between 1985 and 1988. Accordingly, graduates would decline from 5,788 in 1984, to 5,272 in 1990, and to 4,541 by 2000. The total number of new graduates between 1985 and 2000 would be 81,300 or about 8 percent less than in the basic series.

In this low scenario, the number of active pharmacists would rise to 169,800 in 1990 and to 181,500 in 2000, for a ratio of 67.5 active pharmacists per 100,000 population (Table 8-1). Women are projected to comprise 39.9 percent of the active supply by the end of the century, slightly less than in the basic series.

High Alternative Series. The high alternative series assumes that the recent growth in third-to-last-year enrollments seen between 1982 and 1984 will continue until 1988. This projection is predicated upon maintaining recent enrollment increases despite the loss of Federal support, through a combination of State, local, and other support to pharmacy schools. It is therefore assumed that enrollments will continue to increase by an average of

2 percent annually until 1988, the level of recent growth. After this period, it is assumed that third-to-last-year enrollments will change only as the number of persons age 18 to 22 in the population changes. Accordingly, it is assumed that graduates of pharmacy schools will increase from 5,788 in 1984 to 6,112 in 1990, increase to 6,233 in 1992, and decline to 5,529 by the end of the century. The total number of new graduates between 1985 and 2000 would be 93,400 or about 6 percent more than in the basic series.

On this basis, the number of active pharmacists will reach 171,500 in 1990 and 193,200 in the year 2000, for a ratio of 72.1 pharmacists per 100,000 population (Table 8-1). By the end of the century, the precentage of active pharmacists who are women will be 40.8 percent, slightly more than in the basic series.

Payment for Pharmacist Clinical Services

The American Pharmaceutical Association recently conducted a national survey to gauge the willingness of consumers to pay for pharmacists' clinical services. Consumer reaction to the following clinical services were included in the survey: private consultations about the proper use of prescribed medications, maintenance of up-to-date medication records, monitoring of drug therapy, home consultations, and consultations about treatment of minor complaints. The initial public reaction to the concept of clinical pharmacy reimbursement was positive. A substantial proportion of the public indicated willingness to pay for clincal services from the pharmacist. Nearly one half of the respondents indicated willingness to pay a pharmacist to make house calls to consult about medication. Nearly one third expressed willingness to pay a pharmacist for private consultation on medication (Smith, 1983). This willingness to pay for pharmacists' clinical services could have an impact on the demand for pharmacists in the future.

Future Trends in Pharmacy

Participants in the recent "Pharmacy in the 21st Century" conference expect that major factors influencing pharmaceutical use in 2010 will include an increasingly elderly population, more widespread health promotion and wellness activities, more vigorous efforts at proving the cost effectiveness of drugs, a decline in health-care expenditures as a proportion of GNP, and an increase in home remedies and nonconventional therapies (AACP, 1984).

More sophisticated drug delivery systems were foreseen by many, including more prevalent transdermal, aerosol, and pump systems and increasing reliance on controlled-release devices. There was some agreement that delivery systems would have to pass a cost-effectiveness trial before receiving marketing approval.

Participants also believe that a large proportion of prescription drugs will be moved into the over-the-counter category during the next few decades. It is expected that pharmacists of the next century will play an important role in monitoring medications, and while there will be some opportunities for independents, most pharmacists will practice in settings that are part of large health care enterprises or retail chain pharmacies.

Future Supply/Requirements

In 1984 there were an estimated 157,000 active pharmacists in the United States, with an estimated full-time-equivalent supply of 151,300. If pharmacists continue to practice in traditional modes, approximately 176,000 FTE pharmacists would be required in 2000 -- approximately 17 percent more than the supply of pharmacists in 1984. Comparing this estimate with the basic series supply estimates presented above, it appears that supply and requirements for pharmacists would be in close balance at the end of the century.

These projections of requirements for pharmacists are based largely on analyses of the Food and Drug Administration's unpublished empirical data on use of prescription drugs. In the past the number of prescriptions has been the benchmark used as the best single measure of requirements for pharmacists. This is likely to remain the primary factor in measuring pharmacist productivity.

Between 1973 and 1983 there was an overall decline in the number of prescriptions per capita, due principally to a per-capita decline in prescriptions for outpatients. However, the average size of a prescription has steadily increased over time, leading to an increase in the total volume of drugs used.

Expanding Pharmacy Clinical Roles

Expanded clinical roles may be analyzed in terms of the disciplines from which they originally evolved. The clinical pharmacy literature describes roles that have evolved from two particular sources (Fedder, 1984):

1. Those that are firmly based in the discipline of pharmacy itself and are grounded in the unique knowledge or skills of pharmacists. These are part of the pharmacists' acknowledged domain. Although some additional knowledge and further development of skills may be necessary in some instances, massive retraining is not required. Nor is there any need to obtain permission from any other discipline to perform these roles. Education of patients and professionals, drug monitoring, counseling, pharmacokinetics, and nutritional supplementation all fall into this category.

2. Roles that require either legislative or delegated authority for pharmacists to perform. Although they may in fact be natural outgrowths of the practice of pharmacy, these roles generally require structured protocols and may be subject

to medical audit. Drug prescribing, dose adjustment, physical assessment, and some diagnostic functions are included.

Recent surveys indicate that the practice of clinical pharmacy has increased substantially since 1975 within the short-term hospital setting. The number of computerized pharmacies has doubled in the past few years, as has the number of pharmacies providing counseling and monitoring activities (Stolar, 1979, 1983).

Summary

- Although the level of enrollments in schools of pharmacy only recently has begun to increase after a number of years of decline, the number of active pharmacists continues to increase. Supply and requirements of pharmacists are expected to be in close balance throughout the rest of the century.
- Among younger pharmacists, especially women, there appears to be a sharp trend away from independent pharmacies and toward chain pharmacies and particularly hospitals.
- One of the most dramatic trends in the profession has been the tremendous increase in the number and percent of women pharmacists. All expected growth in the active supply of pharmacists will result from the substantial growth in the number of women pharmacists. More than 2 of 5 pharmacists by the end of the century will be female, the highest of any health profession next to nursing.
- Pharmacists, perhaps the most accessible of all health professionals, are playing an increasing role in preventive health care through interaction with patients, an activity with increasing consumer acceptance. Experts in the profession see a continuing role of pharmacists in monitoring medication.

Table 8-1. NUMBER OF ACTIVE PHARMACISTS AND PHARMACIST-TO-POPULATION RATIOS: SELECTED YEARS, ESTIMATED 1970-1984, AND PROJECTED 1985-2000 [1]

Year and alternative projection	Number of active pharmacists	Active pharmacists per 100,000 total population[2]
1970	113,700	54.4
1975	122,800	56.6
1980	143,800	63.0
1984	157,000	66.0
1985	159,200	66.4
Low	159,200	66.4
High	159,200	66.4
1990	170,800	68.1
Low	169,800	67.7
High	171,500	68.4
1995	181,200	69.5
Low	177,200	68.0
High	184,100	70.7
2000	188,200	70.0
Low	181,500	67.5
High	193,200	71.9

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[1] The basic methodology was used for the projections shown for the years 1985 through 2000; alternative assumptions were used for the low and high projections. Includes pharmacists in Federal services; also includes pharmacists in U.S. Possessions.

[2] Ratios are based on total population, including Armed Forces overseas, as of July 1.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

U.S. Bureau of the Census. Current Population Reports, Series P-25, Nos. 952 and 959.

Table 8-2. NUMBER OF ACTIVE PHARMACISTS AND PHARMACIST-TO-POPULATION RATIOS, BY REGION, DIVISION, AND STATE: DECEMBER 31, 1970, 1980, AND 1984

Geographic area	1970		1980		1984	
	Active pharmacists	Active pharmacists per 100,000 resident population	Active pharmacists	Active pharmacists per 100,000 resident population	Active pharmacists	Active pharmacists per 100,000 resident population
UNITED STATES 1/	112,570	55.4	142,780	62.5	156,960	66.0
NORTHEAST	29,524	60.1	32,781	66.5	32,257	64.6
New England	7,697	64.8	9,166	73.9	10,267	81.2
Connecticut	1,998	65.7	2,285	73.1	2,291	72.3
Maine	438	43.9	669	59.2	763	65.7
Massachusetts	4,149	72.8	4,648	80.7	5,483	94.1
New Hampshire	358	48.2	533	57.4	575	58.6
Rhode Island	560	58.8	784	82.4	862	89.1
Vermont	194	43.4	247	48.1	293	55.0
Middle Atlantic	21,827	58.5	23,615	64.0	21,990	58.9
New Jersey	3,838	53.3	4,456	60.3	4,419	58.5
New York	11,474	62.8	10,874	61.8	9,256	51.9
Pennsylvania	6,515	55.1	8,285	69.7	8,315	69.5
MIDWEST	32,588	57.5	39,936	67.8	45,562	76.7
East North Central	22,514	55.8	27,633	66.3	30,330	72.6
Illinois	6,914	62.1	7,311	63.8	7,303	63.1
Indiana	2,964	56.9	3,876	70.7	4,690	84.9
Michigan	4,804	54.0	6,752	73.1	7,965	87.3
Ohio	5,443	51.0	6,059	56.1	6,314	58.4
Wisconsin	2,389	53.9	3,635	76.7	4,058	84.7
West North Central	10,074	61.6	12,303	71.4	15,232	86.5
Iowa	1,753	61.9	2,210	76.0	2,623	89.7
Kansas	1,511	67.2	1,377	58.0	1,715	70.0
Minnesota	2,051	53.7	2,809	68.7	3,576	85.5
Missouri	2,801	59.7	3,629	73.6	4,366	86.7
Nebraska	1,105	74.2	1,287	81.7	1,586	98.3
North Dakota	423	68.3	494	75.3	693	100.5
South Dakota	430	64.4	497	72.2	673	94.9
SOUTH	31,957	50.6	47,389	62.1	54,401	67.2
South Atlantic	14,679	47.6	22,126	59.0	24,896	84.0
Delaware	247	44.8	274	45.9	274	44.5
District of Columbia	326	43.1	688	108.5	784	127.3
Florida	3,329	48.5	5,206	51.9	4,935	44.7
Georgia	2,357	51.1	3,656	66.1	3,742	63.8
Maryland	2,284	57.9	2,691	63.1	2,811	64.3
North Carolina	2,092	41.0	3,324	56.1	4,369	70.5
South Carolina	1,303	50.1	2,177	69.2	2,869	86.5
Virginia	1,940	41.5	3,014	55.8	3,746	66.1
West Virginia	801	45.8	1,096	56.1	1,366	69.7
East South Central	6,833	53.2	10,228	69.6	12,388	82.0
Alabama	1,924	55.7	2,664	68.2	3,477	86.7
Kentucky	1,672	51.7	2,356	64.3	2,731	73.0
Mississippi	1,131	50.8	1,911	75.6	2,218	84.9
Tennessee	2,106	53.4	3,297	71.6	3,962	83.6
West South Central	10,445	53.8	15,035	62.2	17,117	65.3
Arkansas	1,001	51.8	1,608	70.0	2,103	89.1
Louisiana	1,875	51.3	2,252	52.8	2,515	56.1
Oklahoma	1,764	68.6	2,198	71.6	2,371	71.5
Texas	5,805	51.6	8,977	61.7	10,128	63.0
WEST	18,501	52.9	22,674	51.8	24,740	52.7
Mountain	4,820	57.7	7.439	64.3	8,285	65.7
Arizona	930	51.8	1,835	66.4	2,138	69.7
Colorado	1,419	63.7	1,896	64.6	1,976	61.9
Idaho	476	66.3	567	59.5	632	62.8
Montana	328	47.0	592	74.8	698	84.3
Nevada	284	57.4	380	46.0	444	48.5
New Mexico	496	48.4	737	55.7	925	64.6
Utah	651	61.0	1,096	73.3	1,055	63.6
Wyoming	236	70.6	336	69.4	417	81.1
Pacific	13,681	51.3	15,235	47.3	16,455	47.9
Alaska	66	21.6	158	38.7	178	35.4
California	9,790	48.8	10,189	42.5	10,974	42.6
Hawaii	221	28.5	294	30.2	325	31.1
Oregon	1,399	66.5	1,796	67.9	1,839	68.4
Washington	2,205	64.5	2,798	66.9	3,139	71.8

1/ Excludes counts of pharmacists in U.S. Possessions.

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Table 8-3. THIRD-LAST-YEAR ENROLLMENT IN SCHOOLS OF PHARMACY IN THE UNITED STATES, BY SEX: ACADEMIC YEARS 1969-70 THROUGH 1984-85 1/

Academic year	Both sexes	Male	Female
	Number of students		
1969-70	5,428	4,248	1,180
1970-71	5,694	4,345	1,349
1971-72	6,532	4,849	1,683
1972-73	7,546	5,452	2,094
1973-74	8,342	5,834	2,508
1974-75	8,734	5,910	2,824
1975-76	8,710	5,601	3,109
1976-77	8,208	4,969	3,239
1977-78	8,461	5,035	3,426
1978-79	8,321	4,694	3,627
1979-80	8,035	4,398	3,637
1980-81	7,551	3,896	3,655
1981-82	6,899	3,441	3,458
1982-83	6,574	3,078	3,496
1983-84	6,715	3,097	3,618
1984-85	6,849	3,056	3,793
	Percent		
1969-70	100.0	78.3	21.7
1970-71	100.0	76.3	23.7
1971-72	100.0	74.2	25.8
1972-73	100.0	72.3	27.7
1973-74	100.0	69.9	30.1
1974-75	100.0	67.7	32.3
1975-76	100.0	64.3	35.7
1976-77	100.0	60.5	39.5
1977-78	100.0	59.5	40.5
1978-79	100.0	56.4	43.6
1979-80	100.0	54.7	45.3
1980-81	100.0	51.6	48.4
1981-82	100.0	49.9	50.1
1982-83	100.0	46.8	53.2
1983-84	100.0	46.1	53.9
1984-85	100.0	44.6	55.4

1/ These students comprise those in the first year of the three years of professional pharmacy education, excluding any students in pre-pharmacy years.

SOURCE: American Association of Colleges of Pharmacy. Enrollment Report on Professional Degree Programs in Pharmacy, Fall 1984 and earlier published reports.

Table 8-4. NUMBER OF THIRD-LAST-YEAR PHARMACY STUDENTS AND NUMBER OF PHARMACY GRADUATES, BY SEX: PROJECTED FOR ACADEMIC YEARS, 1985-86 THROUGH 1999-2000 1/

Academic year	Number of third-last-year students			Number of graduates		
	Total	Male	Female	Total	Male	Female
1985-86	6,849	3,056	3,793	5,644	2,544	3,100
1986-87	6,849	3,056	3,793	5,759	2,510	3,249
1987-88	6,849	3,056	3,793	5,759	2,510	3,249
1988-89	6,849	3,056	3,793	5,759	2,510	3,249
1989-90	6,849	3,056	3,793	5,759	2,510	3,249
1990-91	6,766	3,019	3,747	5,759	2,510	3,249
1991-92	6,670	2,976	3,694	5,759	2,510	3,249
1992-93	6,500	2,900	3,600	5,690	2,480	3,210
1993-94	6,314	2,817	3,497	5,609	2,444	3,165
1994-95	6,109	2,726	3,383	5,466	2,382	3,084
1995-96	6,074	2,710	3,364	5,310	2,314	2,996
1996-97	6,074	2,710	3,364	5,131	2,231	2,892
1997-98 through 1999-2000	6,074	2,710	3,364	5,108	2,226	2,882

1/ The basic methodology was used for all of these projections.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 8-5. NUMBER OF ACTIVE PHARMACISTS, BY SEX: ESTIMATED 1984, AND PROJECTED FOR SELECTED YEARS, 1985-2000 [1]

Year	Number of active pharmacists	Male pharma-cists	Female pharma-cists	Percent female of all pharmacists
1984	157,000	119,600	37,400	23.8
1985	159,200	119,300	39,900	25.1
1990	170,800	117,800	53,000	31.0
1995	181,200	115,600	65,600	36.2
2000	188,200	112,100	76,100	40.4

[1] The basic methodology was used for all of these projections. Includes pharmacists in Federal service; also includes pharmacists in U.S. Possessions.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Chapter 9

VETERINARY MEDICINE

Developments in Supply

Veterinary Medicine and Human Health. Veterinary medicine plays a major role in the human health care delivery system with activities directly related to the protection of human health. They help prevent the outbreak and spread of animal diseases, some of which - like rabies - can be transmitted to human beings. In addition, veterinarians are involved in food protection, as well as, the prevention and control of environmental hazards. They also work on scientific research teams on such projects as searching out new pharmaceuticals to treat heart disease.

The impact of environmental health hazards and food-borne diseases upon human health has received increasing attention. The control of ingestion of toxic chemicals by livestock has become a high priority objective as laboratory research reveals their harmful effects on human health. Increased emphasis has been placed upon development of veterinarians who will be able to deal with chemical contamination of the food chain.

Another area upon which increased emphasis is being placed is animal pathology, particularly in laboratory research settings. New and sophisticated equipment in the laboratory require special skills that are being developed by veterinarians.

Current Supply. The supply of active veterinarians grew 37 percent between 1975 and 1984. In 1984, approximately 42,600 veterinarians were active in the United States, up from 31,100 in 1975 (Table 9-1). Although men outnumbered women 84.7 percent to 15.3 percent among active veterinarians in 1984, the supply of female veterinarians has grown much faster in recent years. Between 1977 and 1984, male veterinarians increased 20 percent (from 30,100 to 36,100) while female veterinarians increased 124 percent (from 2,900 to 6,500). The growing number of women in the profession reflects substantial increases in the enrollment of women in veterinary schools.

The increased entry of women into the profession in recent years is also reflected in the age distribution of active veterinarians, because female veterinarians are generally younger. The median age of all active veterinarians in 1984 was 38.9 years. Seventy-four percent were aged 49 or younger, 21 percent were between 50 and 64, and 5 percent were 65 or older. The median age for men was just over 41 years, and nearly 70 percent of them were under 50. Women veterinarians had a median age of slightly more than 31 years, and 76 percent were under 35.

Practice Characteristics. Currently, there are 41 different professional activities in which veterinarians can be engaged. There are also 12 specialties with established educational requirements and competency certifying procedures. The Board-certified specialties include toxicology, laboratory animal medicine, theriogenology (animal reproduction), anesthesiology, dermatology, internal medicine (with subspecialties in cardiology and neurology), microbiology, ophthalmology, pathology, preventive medicine, radiology, and surgery.

According to the Master File of the American Veterinary Medical Association in 1984, the principal activities of three-fourths of all active veterinarians were in large-, small-, and mixed-animal practices.[1] Within these areas 38 percent of all active veterinarians were in small-animal practices, 32 percent in mixed-animal practices, 4 percent in large-animal practices, and the rest in a variety of other veterinary occupations. These same activities also represented the largest portion of active veterinarians in 1979.

While increases in the number of active veterinarians have occurred in most specialties, slight declines have occurred in veterinary public health, regulatory veterinary medicine, and avian pathology.

In 1984, 48 percent of all active veterinarians were self employed, and about 28 percent worked in other private practices (Table 9-2). Together, these two groups grew from 27,000 in 1979 to 32,400 in 1984, a 20 percent increase. Large-, small-, and mixed-animal practices drew 97 percent of all self-employed veterinarians and approximately the same percent of all veterinarians employed in private practice in 1984.

Colleges, universities, and industrial settings showed increases in veterinarians between 1979 and 1984, while decreases of veterinarians have taken place in the Federal and State governments. In 1984, most veterinarians working for the Federal Government engaged in regulatory medicine (61 percent), while 6 percent worked in public health. State and local government veterinarians worked principally in regulatory medicine and public health (42 percent and 14 percent respectively).

In 1984, 76 percent of all active veterinarians were primarily engaged in clinical practice, with most of the remainder in research, education, inspection, and management. Ninety-six percent of veterinarians in clinical practice were self-employed or employed in other private practices. Among veterinarians engaged in research, 44 percent were employed by colleges or universities, 26 percent were in private industry, and most of the remainder were employed by the Federal Government as civilians or members of the Armed Forces. Among veterinarians engaged in inspection activities, 63 percent were employed by the Federal government, 18 percent were employed by State and local governments, and 7 percent were in the Armed Forces, and the remainder are distributed within other types of employers.

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[1] Bovine, equine, and porcine practices are included in figures for large-animal practices.

Geographic Distribution. Although relatively few veterinarians have large-animal practices, proximity to farms and farm animals has a strong effect on distribution of veterinarians. Unlike the situation with other health professions, nonmetropolitan counties have higher veterinarian-to-population ratios than metropolitan counties.

The highest ratios of veterinarians to population are found in the Midwest (21.7 per 100,000) and the West (19.4 per 100,000), while the Northeast has the lowest ratio (12.8 per 100,000) (Table 9-3). The supply of veterinarians in individual States is related to the amount of farming. Iowa, Montana, Kansas, Nebraska, South Dakota, and Colorado, which have large percentages of land committed to farming, have very high ratios of veterinarians, while States such as Massachusetts, New York, Rhode Island, South Carolina, and West Virginia have low ratios. The relationship between veterinarian supply and farm land exists despite differences in types of farming and types of animal stock among States. Although there has been considerable interest in increasing the supply of veterinarians in large-animal practices during recent years, the ratios of veterinarians to population in farm States did not appear to grow any faster than in other States.

Current Income of Veterinarians. The recent economic survey of the American Veterinary Medical Association found that the average net income of veterinarians in private practice in 1983 was $46,255. Average income for specific types of private practice ranged from a low of $40,566 for mixed-animal practitioners to a high of $53,524 for equine practitioners. Average incomes for other practice types ranged downward as follows: small-animal practice exclusively, $47,533; large-animal exclusively, $46,310; large-animal predominantly, $45,957; and small-animal predominantly, $43,991.

The 1983 average income of veterinarians not in private practice was $46,422. Average incomes for specific types of nonprivate practice ranged from a low of $36,517 for Armed Forces veterinarians to a high of $61,170 for those in industry. Average income levels were $37,854 for veterinarians employed by State or local governments, $42,431 for those employed by the Federal Government, and $44,513 for veterinarians working in colleges or universities (Wise, October 1984).

Competency Assurance. Licensure to practice veterinary medicine is required in all States, the District of Columbia, Puerto Rico, and Guam. Continuing education is required for relicensure in 26 States, Puerto Rico, and the District of Columbia. At this time as few as 4 and as many as 20 contact hours per year of approved veterinary continuing education can be required of veterinarians as a license renewal requirement. Most States still renew veterinary licenses annually, but the trend is toward increasing the renewal interval. Several States are now on a 2-year cycle, and Iowa and Puerto Rico have gone to 3 years.

Veterinary Service Expenditures for Pet Care. A recent nationwide survey conducted by the American Veterinary Medical Association reported that dogs were seen by veterinarians an average 1.1 times during the previous year. The survey also found that 36 million households in the Nation owned 55 million dogs. The average annual expenditure for veterinary care was $52 per dog or a total of $2.6 billion during the year. This total is about 56 percent of the $4.6 billion in annual expenditures for veterinary services by U.S. households and farms in the 1982 to 1983 period (Wise, January and February 1984).

The same survey also showed that 52 million cats were owned by 24 million households. The average cat was seen by a veterinarian only once during a 30 month period (an average of 0.4 times in a 12-month period). The total expenditures on cats for veterinary services was estimated to be $955 million during the year.

Current Requirements. As of March 31, 1985, 623 geographic areas, with a population of nearly 14.6 million persons, were designated health manpower shortage areas with respect to veterinary care. A total of 1,598 more food-animal veterinarians would be needed to achieve a ratio of 10,000 veterinary livestock units per veterinarian. While only 6 percent of the designated areas were metropolitan, such areas covered 19 percent of the population in designated areas.

Student Trends and Developments

Applicants. The number of applicants to schools of veterinary medicine has decreased steadily in the last few years, from 7,286 in academic year 1980-81 to 5,503 in 1984-85. The proportion of applicants admitted to schools of veterinary medicine has increased noticeably during these years because the number of first-year student places has remained fairly constant. In 1980-81, there were more than 3 applicants per first-year student, with only 31 percent of the applicants enrolled. By 1984-85, the number of applicants per first-year place had decreased to 2.4, and 42 percent of the applicants enrolled. Of the 1984-85 applicants, 52.4 percent were women, and 6.1 percent belonged to minorities, including 2.3 percent Hispanic and 2.0 percent Black.

Enrollments and Graduates. Enrollments in veterinary schools have increased dramatically over the past two decades, with the largest percentage increases occurring since the mid-1970s. Between 1960-61 and 1970-71, first-year enrollments rose 45 percent, from 983 to 1,430 (Table 9-4). During the 1970s, first-year enrollments grew even faster, reaching 2,329 by academic year 1984-85 -- 63 percent higher than in 1971-72 and 137 percent higher than in 1961-62. The number of graduates has increased by 160 percent in two decades, rising from 819 in 1961-62 to 1,258 in 1971-72 and 2,138 in 1983-84. Total enrollment in 1984-85 was 8,843, an increase of 1.1 percent over the previous year. Although much of the increase in enrollments can be attributed to previous Federal support, State governments have continued substantial support to schools of veterinary medicine.

The increased enrollment of women has been a major development in schools of veterinary medicine. In 1984, 1,176 or more than 50 percent of the entering students in veterinary schools were women. Of all veterinary students in 1984, nearly 49 percent were women, compared with 1 of 5 in 1974 and fewer than 1 of 10 in 1970 (Table 9-5).

In 1984, only 484 students, just under 6 percent of total enrollments, were members of minority groups, a proportion that has risen only slightly in several years. Nearly a third of them were enrolled in one school -- Tuskegee Institute. Black students accounted for 217 minority enrollees in veterinary schools; Hispanic students accounted for 142.

Institutional Trends and Developments

Schools. The number of veterinary schools rose from 18 in 1970 to 21 in 1976 and 27 in 1984. New schools opening in recent years include Oregon State and Tufts (which admitted their first classes in 1979), Virginia Polytechnic Institute (1980), North Carolina State and Tennessee (1981), and Wisconsin (1983).

Accredited schools of veterinary medicine are located primarily in the Southern (11 schools) and Midwest States (9). There are 4 schools in the West and 3 in the Northeast. Five schools accounted for more than 31 percent of all graduates in 1984 -- California, Colorado State, Iowa State, Ohio State, and Texas A & M University. Colorado State University and Texas A & M had the largest first-year enrollments, 140 and 139 students respectively.

Distribution/Compacts. The 27 schools of veterinary medicine are located in 26 States, with only Alabama having two schools. Seventeen schools have compact agreements that provide for admission of students from other States; 9 schools have no such agreements. Many compact agreements are with two regional organizations: the Southern Regional Educational Board and the Western Interstate Commission on Higher Education. In addition, several States have agreements with a school or a regional organization that specify a minimum number of first-year positions to which students will be admitted.

Because of the decrease in applicants and in the ratio of applicants to first-year places, many schools are willing to consider applicants from States other than those with which they have compact agreements. Many are therefore increasing the number of States from which applicants may be considered for admission.

Manpower Trends Related to Veterinary Education. A recent study has shown a generally decreasing trend in the number of faculty positions in the disciplines of veterinary pharmacology and toxicology. Despite an increase in the number of faculty positions available in schools of veterinary medicine, the supply of faculty in these positions is decreasing. The study recommends that effective ways be found to attract veterinary medical students into these areas (Heath, 1983).

During recent years, fewer veterinarians have entered large-animal practices and some areas have shortages of food-animal veterinarians. Many managers of large-scale dairy operations have begun to rely heavily on nonveterinarians for services such as nutrition and preventive medicine. Many investigators have pointed out that operators of large dairies require veterinary services that emphasize a herd health approach and that improved training will be required before veterinarians will be able to integrate economic herd health and clinical knowledge effectively to allow them to participate fully in all aspects of herd health management.

In response, veterinary schools in recent years have begun to offer course work in subjects such as biostatistics, epidemiology, and environmental health, and nine schools have instituted programs in preventive medicine. Also, with encouragement and direct assistance from the American Association of Bovine Practitioners, retraining programs have been established to help practicing veterinarians acquire herd management skills (Goodger, 1983).

Salaries and Educational Indebtedness of Recent Graduates. A recent survey of the 1984 graduating classes of veterinary medicine by AVMA shows that starting income of graduates was slightly higher (1.3 percent) than for 1983 graduates. One third of all graduates entered into small-animal exclusive practices. Their starting salaries averaged $20,600, slightly higher than the average salary of $19,500 for all graduates.

Survey results also show that the mean educational indebtedness of 1984 graduates was $20,540, up 8.7 percent from 1983 graduates. The relative frequency distribution showed that 20 percent of all graduates, the same as in 1983, had an educational debt of between $15,000 and $20,000. More than 36 percent of all 1984 graduates as compared with 26 percent of 1983 graduates had debt in excess of $20,000 (Wise, 1984). The remaining 44 percent of the 1984 graduates had debts of less than $15,000.

Faculty. About 3,100 academic and professional personnel (excluding interns and residents) were employed in U.S. schools of veterinary medicine in 1984-85. Nearly 2,300 or 74 percent held veterinary degrees. In addition, more than 1,500 of the faculty held a Ph.D. degree either in combination with or independent of a veterinary degree. The total faculty has grown by more than 4 percent per year since 1974 -- somewhat faster than total enrollments. The result has been a gradual increase in the faculty to student ratio over this period.

Postdoctoral Training. Of the students enrolled in U.S. schools of veterinary medicine in 1984, 80 percent were undergraduates seeking veterinary degrees. Approximately 20 percent of students enrolled in a U.S. school of veterinary medicine sought advanced degrees or certificates of advanced training. The largest group of these were comprised of students with veterinary degrees seeking either a M.S. or Ph.D. The remaining groups consisted of other graduate students seeking advanced degrees and veterinary graduates seeking certificates of internship and residency.

Educational Costs. Among State-supported schools, tuition charges for State residents in 1984-85 (and students enrolled under compact agreements) range from $730 to $6,900 per year, with most State-supported schools charging tuitions of $3,600 or less for these students. Nonresident tuition and tuitions in private schools are considerably higher, with the majority of schools charging tuition of $6,000 or more.

Tuitions defray only part of the cost of educating a veterinary student. The estimated total annual cost to the institution is estimated at nearly $20,000 per student.

Graduates of Foreign Schools. Between 1973 and 1984, 571 graduates of foreign veterinary schools successfully passed the examination given by the Educational Commission for Foreign Veterinary Graduates (ECFVG), which is required of foreign-school graduates who wish to take State licensure examinations. Slightly more than one-third of individuals registered for the ECFVG examination during this period successfully completed the examination. Currently 487 candidates are enrolled in the ECFVG program.

Projections of Future Supply

The supply of veterinarians is expected to rise in the coming years. Three sets of projections of the supply of active veterinarians between 1984 and 2000 are presented here. Each rests on different assumptions regarding the number of new veterinary graduates during the projection period. Each set of projections assumes that the first-year enrollment of women will remain at 50 percent throughout the projection period.

Basic Series. Projections of enrollments and graduates of schools of veterinary medicine are critical to projections of overall supply in the profession. The basic (or most likely) supply projection series assumes that 27 existing schools (including the relatively new school at Wisconsin) will maintain first-year enrollments at the level achieved in 1984-85 during the projection period. Even with the decline of Federal support, it is assumed that the present level of support for veterinary schools from State governments will continue, allowing enrollment levels in existing schools to be sustained. First-year enrollment would therefore be maintained at 2,329 from 1984 to the end of the projection period. Graduates would increase from 2,138 in 1984 to 2,169 in 1987 and to 2,213 in 1989 and would remain at that level through the projection period. The total number of students graduated between 1985 and 1990 would be 13,000, or about 26 percent of all veterinarians active in 1990. The number of graduates produced between 1985 and 2000 would be 35,200 or 56 percent of the active supply in the year 2000.

The basic assumption, that of maintenance of 1984-85 enrollments as indicated above, results in an average annual increase of 1,220 veterinarians between 1985 and 2000. The supply of active veterinarians would then increase from 42,600 in 1984 to 50,400 in 1990 -- an 18 percent increase in 6 years or an average of 3 percent annually (Table 9-1). The growth rate over the next 10 years, between 1990 and 2000, would be somewhat slower (24 percent), with active supply rising to 62,700 in the year 2000. The ratio of active active veterinarians per 100,000 population is projected to rise from 18.0 in 1984 to 20.1 in 1990 and 23.3 by the end of the century.

The proportion of active female veterinarians is projected to increase sharply, rising from 15.3 percent in 1984 to 35.9 percent in 2000. The number of women in veterinary medicine would nearly double between 1984 and 1990 and would increase by another 80 percent between 1990 and 2000, reaching 22,500 by the end of the century (Table 9-5).

Low Alternative Series. The low series of supply projections assumes that veterinary medicine schools will be unable to maintain enrollments at current levels. It is assumed that reduced enrollments would occur as a result of declining Federal funding, higher costs, and increasing competition, thereby reducing applications for veterinary education.

The low alternative series assumes that first-year enrollments in existing schools will decline 10 percent between 1984 and 1988 and that no new schools will open during this period. First-year enrollment would therefore decline from 2,329 in 1984 to 2,096 in 1988, after which it would remain constant. The total number of new graduates between 1985 and 2000 would be 32,800, about 7 percent less than in the basic series.

Under this low series, the number of active veterinarians would increase only to 60,400 by the end of the century, yielding a ratio of 22.4 per 100,000 population (Table 9-1). The number of veterinarians in the year 2000 would be 2,300 less, or 3.7 percent fewer than the number projected in the basic series.

High Alternative Series. A high alternative series assumes very small (1 percent per year) increases in first-year enrollments until 1988. After this period, enrollment would be maintained through the end of the projection period. In this series, first-year enrollments are expected to increase from 2,329 in 1984 to 2,424 in 1988. This series assumes somewhat greater levels of support of veterinary education among State and local governments. Graduates are projected to rise from 2,134 in 1985 to 2,234 in 1989 and 2,302 in 1992, after which they would remain constant throughout the projection period. Under these assumptions, 36,100 students would graduate between 1985 and 2000 -- 3 percent more than in the basic series.

In the high alternative series, the number of veterinarians is projected to increase to 50,500 in 1990 and 63,600 in 2000, yielding a ratio of 23.7 active veterinarians per 100,000 population (Table 9-1). The number of active veterinarians would be 1.4 percent greater than in the basic series by the end of the century.

Future Supply/Requirements

It is estimated that 59,500 veterinarians will be required by 2000, compared to the projected supply of 62,700 in that year. However, it should be noted that severe data limitations make it unusually difficult to estimate requirements for veterinarians. While data are available on numbers of veterinarians active in specific practice areas, there is a shortage of data on veterinarian productivity or the utilization of specific services by the public.

The projection procedures assume that increases in requirements for small-animal veterinarians are proportional to changes in retail pet food sales, per capita income, and population. Changes in per capita consumption of beef and pork, which correspond to changes in the number of beef cattle and other food animals, provide a basis for estimating requirements for large-animal veterinarians. The assumption of an increase in requirements for veterinarians in educational institutions is based on a recent AVMA funded study that foresees demand for veterinarians in this setting rising about 4.5 percent annually.

Requirements for large-animal veterinarians are not likely to increase as rapidly. Only moderate growth in food-animal production is forecast. It is likely that producers will increase their use of veterinary services somewhat, but the resulting growth in food-animal requirements will likely lag behind those for companion animals.

Strong growth is expected in the more highly specialized areas of veterinary medicine. Research fields such as toxicology and animal pathology are expected to continue to grow as a result of demand created by industry and regulatory agencies. Offsetting these increases will be declines in meat inspection as government agencies replace veterinarians with other professionals.

According to a 1982 report from the National Research Council, the Nation has enough veterinarians to care for family pets and domestic farm animals and may even have a modest surplus by 1990. However, a growing need exists for veterinarians with advanced scientific degrees or special experience to work in environmental and consumer protection, food production, research, and other activities not related to veterinary care. The report further states that while demand for general practitioners has stabilized, demand for veterinary specialists trained in pathology and laboratory-animal medicine employed in industry and contract research laboratories increased in the late 1970s and continued to increase through 1984.

Industrial Employment of Veterinarians

A recent survey of veterinary employment in industry by the American Veterinary Medical Association showed that 660 veterinarians were employed in the United States by the 115 responding companies. The majority of veterinarians in industry specialized in pathology, toxicology or laboratory animal science. Analysis of future employment needs indicated that the number of veterinarians needed by private industry will increase by 44 percent in the years 1985 to 1990, and by 94 percent in the years 1991 to 2000. In other words, by the turn of the century the number of veterinarians needed by industry is expected to double over current levels.

Companies that currently employ more than five veterinarians expect to employ 30 percent more by 1990 and 64 percent more by the end of the century. Companies that employ fewer than five veterinarians anticipate higher percentage increases in hirings of veterinarians (ranging from 100 to 170 percent) by the year 2000. As a result, about two-thirds of future hirings will be by companies currently employing five or more veterinarians, and about one-third of future hirings will be by companies currently employing fewer than five veterinarians (Wise, January 1985).

Summary

- The number of active veterinarians has increased substantially in recent years with approximately 1,200 veterinarians being added each year.
- Nearly 7 of 10 veterinarians provide care for small pets or a combination of pets and larger animals. More than three-fourths were self employed or in other forms of private practice.
- During recent years, fewer veterinarians have entered large-animal practice and some areas have shortages of food-animal veterinarians. Although a smaller proportion of veterinarians serve large animals exclusively, proximity to farms and farm animals continues to have a strong effect on the activity of veterinarians.
- Although the number of applicants to schools of veterinary medicine has been decreasing, the ratio of applicants to first-year admissions (more than 2 to 1) indicates that current enrollment levels will at least be maintained. Consequently, the supply of active veterinarians is expected to grow to 52,000 by 1990 and to nearly 63,000 by the end of the century.
- Females now account for nearly one half of all students in schools of veterinary medicine.
- Although there may be a decrease in requirements in some areas of veterinary medicine, strong growth is expected in research areas such as toxicology and animal pathology. The need for veterinarians by private industry is also expected to grow substantially.

Table 9-1. NUMBER OF ACTIVE VETERINARIANS AND VETERINARIAN-TO-POPULATION RATIOS: SELECTED YEARS, ESTIMATED 1970-1984, AND PROJECTED 1985-2000 [1]

Year and alternative projection	Number of active veterinarians	Active veterinarians per 100,000 total population [2]
1970	25,900	12.5
1975	31,100	14.3
1980	36,500	16.0
1984	42,600	18.0
1985	43,900	18.3
Low	43,900	18.3
High	43,900	18.3
1990	50,400	20.1
Low	50,300	20.1
High	50,500	20.1
1995	56,800	21.9
Low	55,600	21.4
High	57,300	22.2
2000	62,700	23.3
Low	60,400	22.4
High	63,600	23.7

[1] The basic methodology was used for the projections shown for the years 1985 through 2000; alternative assumptions were used for the low and high projections. Includes veterinarians in Federal services.

[2] Ratios are based on total population, including Armed Forces overseas.

SOURCE: 1970 and 1975 active veterinarians derived by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the American Veterinary Medical Association. Projections by HRSA, BHPr, DADHP.

U.S. Bureau of the Census, Current Population Reports, Series P-25, Nos. 952 and 964.

Table 9-2. NUMBER AND PERCENT DISTRIBUTION OF ACTIVE VETERINARIANS, BY TYPE OF EMPLOYMENT, AND BY SEX: DECEMBER 31, 1984

Type of employment	All active veterinarians		Male		Female	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
All active	42,600	100.0	36,100	100.0	6,500	100.0
Self-employed	20,400	47.9	18,900	52.2	1,500	23.8
Private practice employee	12,000	28.2	8,500	23.6	3,500	53.5
College or university	4,700	11.0	3,900	10.9	800	12.4
Industrial employee	1,100	2.6	1,000	2.8	100	1.3
Federal government (civilian)	1,400	3.3	1,300	3.7	100	1.8
Armed Forces	650	1.5	600	1.6	50	0.8
State or local government	750	1.8	700	2.0	50	0.8
Other	1,600	3.7	1,200	3.2	400	5.6

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 9-3. NUMBER OF ACTIVE VETERINARIANS AND VETERINARIAN-TO-POPULATION RATIOS, BY REGION, DIVISION, AND STATE: DECEMBER 31, 1970, 1980, AND 1984

Geographic area	1970		1980		1984	
	Active veteri-narians	Active veterinarians per 100,000 resident population	Active veteri-narians	Active veterinarians per 100,000 resident population	Active veteri-narians	Active veterinarians per 100,000 resident population
UNITED STATES	25,900	12.7	36,000	15.8	42,570	17.9
NORTHEAST	4,081	8.3	5,366	10.9	6,393	12.8
New England	959	8.0	1,459	11.9	1,789	14.2
Connecticut	247	8.1	381	12.2	452	14.3
Maine	99	9.9	155	13.7	196	16.9
Massachusetts	391	6.8	564	9.8	696	11.9
New Hampshire	86	11.6	150	16.1	199	20.3
Rhode Island	47	4.9	70	7.4	83	8.6
Vermont	89	19.7	139	27.0	163	31.5
Middle Atlantic	3,122	8.4	3,907	10.6	4,604	12.3
New Jersey	570	7.9	802	10.8	958	12.7
New York	1,543	8.6	1,732	9.8	2,078	11.7
Pennsylvania	1,009	8.5	1,373	11.6	1,568	13.1
MIDWEST	9,125	16.1	11,587	19.7	12,879	21.7
East North Central	5,019	12.4	6,664	16.0	7,475	17.9
Illinois	1,339	12.0	1,648	14.4	1,818	15.7
Indiana	800	15.3	1,008	18.4	1,132	20.5
Michigan	992	11.1	1,407	15.2	1,590	17.4
Ohio	1,220	11.4	1,604	14.9	1,720	15.9
Wisconsin	668	15.0	997	21.0	1,215	25.4
West North Central	4,106	25.0	4,923	28.6	5,404	30.7
Iowa	1,188	41.9	1,292	44.4	1,382	47.3
Kansas	610	27.1	760	32.0	834	34.0
Minnesota	782	20.4	989	24.2	1,104	26.4
Missouri	763	16.2	1,006	20.4	1,103	21.9
Nebraska	452	30.3	511	32.4	579	35.9
North Dakota	100	16.2	132	20.1	160	23.2
South Dakota	211	31.7	233	33.9	242	34.1
SOUTH	7,472	11.8	11,589	15.2	14,163	17.5
South Atlantic	3,540	11.5	5,228	14.0	6,598	16.6
Delaware	78	14.2	82	13.7	93	15.1
District of Columbia	81	10.8	93	14.7	84	13.4
Florida	853	12.4	1,440	14.4	1,946	17.6
Georgia	618	13.4	878	15.9	999	17.0
Maryland	643	16.3	828	19.4	988	22.6
North Carolina	406	8.0	681	11.5	963	15.5
South Carolina	203	7.8	288	9.1	357	10.8
Virginia	568	12.2	794	14.7	980	17.3
West Virginia	90	5.1	144	7.4	188	9.6
East South Central	1,351	10.5	2,120	14.4	2,547	16.9
Alabama	442	12.8	625	16.0	730	18.2
Kentucky	353	10.9	527	14.4	644	17.2
Mississippi	215	9.7	344	13.4	390	14.9
Tennessee	341	8.7	624	13.5	783	16.5
West South Central	2,581	13.3	4,241	17.5	5,018	19.1
Arkansas	211	11.0	342	14.9	432	18.3
Louisiana	307	8.4	573	13.4	709	15.8
Oklahoma	421	16.3	694	22.6	837	25.3
Texas	1,642	14.6	2,632	18.1	3,040	18.9
WEST	5,222	15.0	7,458	17.0	9,135	19.4
Mountain	1,626	19.4	2,473	21.4	3,138	24.9
Arizona	246	13.7	457	16.5	600	19.6
Colorado	591	26.6	773	26.3	1,066	33.4
Idaho	165	22.9	279	29.3	332	33.0
Montana	186	26.7	270	34.1	297	35.9
Nevada	85	17.2	138	16.7	198	21.6
New Mexico	144	14.1	234	17.7	273	19.1
Utah	121	11.3	172	11.5	204	12.3
Wyoming	88	26.0	150	31.0	168	32.7
Pacific	3,596	13.5	4,985	15.5	5,997	17.5
Alaska	24	7.9	83	20.3	106	21.1
California	2,569	12.8	3,386	14.1	4,071	15.8
Hawaii	68	8.8	102	10.5	131	12.5
Oregon	322	15.3	499	18.9	622	23.1
Washington	613	17.9	915	21.9	1,067	24.4

SOURCE: Estimated by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Table 9-4. NUMBER OF SCHOOLS OF VETERINARY MEDICINE, STUDENTS, AND GRADUATES: ACADEMIC YEARS 1960-61 THROUGH 1984-85

Academic year	Number of schools	Number of students		Number of graduates
		Total	First year	
1960-61	18	3,497	983	824
1961-62	18	3,528	1,001	819
1962-63	18	3,632	1,044	830
1963-64	18	3,727	1,059	834
1964-65	18	3,864	1,139	815
1965-66	18	4,119	1,242	910
1966-67	18	4,388	1,305	963
1967-68	18	4,623	1,315	1,064
1968-69	18	4,779	1,311	1,129
1969-70	18	4,876	1,339	1,165
1970-71	18	5,006	1,430	1,239
1971-72	18	5,149	1,453	1,258
1972-73	18	5,439	1,580	1,280
1973-74	19	5,763	1,594	1,388
1974-75	19	6,005	1,669	1,408
1975-76	19	6,274	1,712	1,523
1976-77	21	6,571	1,856	1,591
1977-78	22	6,918	1,973	1,640
1978-79	22	7,334	2,089	1,704
1979-80	23	7,803	2,247	1,845
1980-81	25	8,156	2,239	1,932
1981-82	26	8,391	2,246	1,969
1982-83	26	8,538	2,211	1,976
1983-84	27	8,672	2,284	2,138
1984-85	27	8,843	2,329	- 1/

1/ Data not yet available.

SOURCE: Data compiled by Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, based on data from the Association of American Veterinary Medical Colleges.

Table 9-5. FIRST-YEAR ENROLLMENT IN SCHOOLS OF VETERINARY MEDICINE IN THE UNITED STATES, BY SEX: ACADEMIC YEARS 1968-69 THROUGH 1984-85

Academic year	Both sexes	Male	Female
	Number of students		
1968-69	1,327	1,207	120
1969-70	1,341	1,195	146
1970-71	1,430	1,286	144
1971-72	1,453	1,231	222
1972-73	1,580	1,295	285
1973-74	1,594	1,230	364
1974-75	1,669	1,262	407
1975-76	1,711	1,230	481
1976-77	1,866	1,237	629
1977-78	1,973	1,267	706
1978-79	2,086	1,320	766
1979-80	2,255	1,343	912
1980-81	2,239	1,268	971
1981-82	2,246	1,167	1,079
1982-83	2,211	1,112	1,099
1983-84	2,284	1,173	1,111
1984-85	2,329	1,153	1,176
	Percent		
1968-69	100.0	91.0	9.0
1969-70	100.0	89.1	10.9
1970-71	100.0	89.9	10.1
1971-72	100.0	84.7	15.3
1972-73	100.0	82.0	18.0
1973-74	100.0	77.2	22.8
1974-75	100.0	75.6	24.4
1975-76	100.0	71.9	28.1
1976-77	100.0	66.3	33.7
1977-78	100.0	64.2	35.8
1978-79	100.0	63.3	36.7
1979-80	100.0	59.6	40.4
1980-81	100.0	56.6	43.4
1981-82	100.0	52.0	48.0
1982-83	100.0	50.3	49.7
1983-84	100.0	51.4	48.6
1984-85	100.0	49.5	50.5

SOURCE: Association of American Veterinary Medical Colleges. Unpublished data.

Table 9-6. NUMBER OF ACTIVE VETERINARIANS, BY SEX: ACTUAL 1984, AND PROJECTED FOR SELECTED YEARS, 1985-2000 [1]

Year	Number of active veterinarians	Male veterinarians	Female veterinarians	Percent female of all veterinarians
1984	42,600	36,100	6,500	15.3
1985	43,900	36,400	7,500	17.1
1990	50,400	37,900	12,500	24.8
1995	56,800	39,200	17,600	31.0
2000	62,700	40,200	22,500	35.9

[1] The basic methodology was used for all of these projections.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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Chapter 10

NURSING

A. OVERVIEW OF BIENNIAL NURSING REPORTS

This is the fifth report to the Congress in response to the statutory requirements in section 951 of Public Law 94-63 directing the Secretary of Health and Human Services to provide the Congress, on a continuing basis, detailed information on the supply and distribution of and the requirements for nurses as well as on factors affecting supply and distribution. These data were to be used to determine the adequacy of the supply, from the standpoint of type and level of preparation, in relation to population needs and demands for nursing services. Section 951 further directed the Secretary to incorporate in reports to the Congress recommendations for legislation that would achieve an adequate supply and equitable distribution of nurses nationally and within each State. The annual reporting requirement in section 951 of P.L. 94-63 was subsequently amended by section 12(h), P.L. 95-623 (see copy, page 2) to require biennial reports.

Fulfilling the reporting requirements is a complex task. In terms of sheer volume, information must be collected and analyzed on the 2.8 million nursing personnel who are employed in the health care system. Aggregate numbers are of less significance in determining adequacy of the nurse supply than are data on relatively small segments within the total supply. These data must be examined and analyzed separately. The 2.8 million nursing personnel represent a range of competencies, from those with on-the-job training to those prepared for complex responsibilities in the management of patient care or the administration of nursing services. Moreover, they are distributed among a vast array of practice settings. Accordingly, a plan of action was developed to acquire and analyze data to meet the statutory requirement, which required the development of new tools for analyzing nursing resources and requirements by initiating projects that would integrate analysis of data collected in a number of different ways and through a number of different sources.

A series of reports was developed to comply with these requirements. The first of these, First Report to the Congress, February 1, 1977 (USDHEW, DN, 1977) relied, of necessity, on information that was already available, and it therefore dealt primarily with information on the supply and distribution of nursing personnel.

New models were also developed for projecting requirements and making determinations of the anticipated nurse supply. The methodologies for both these requirements and supply as well as the projections from these models are fully described in Nurse Supply, Distribution and Requirements. Third Report to the Congress, February 17, 1982 (USDHEW, DN, 1982).

The general conclusion of the Second Report that supply and requirements would be roughly in balance by 1985 was tempered by the acknowledgment that maldistribution might continue to exist in certain areas of the country, in

PART D—MISCELLANEOUS

INFORMATION RESPECTING THE SUPPLY AND DISTRIBUTION OF AND REQUIREMENTS FOR NURSES

42 USC 296 note.

SEC. 951. (a)(1) Using procedures developed in accordance with paragraph (3), the Secretary of Health, Education, and Welfare (hereinafter in this section referred to as the "Secretary") shall determine on a continuing basis—

(A) the supply (both current and projected and within the United States and within each State) of registered nurses, licensed practical and vocational nurses, nurse's aides, registered nurses with advanced training or graduate degrees, and nurse practitioners;

(B) the distribution, within the United States and within each State, of such nurses so as to determine (i) those areas of the United States which are oversupplied or undersupplied, or which have an adequate supply of such nurses in relation to the population of the area, and (ii) the demand for the services which such nurses provide; and

(C) the current and future requirements for such nurses, nationally and within each State.

Survey.

(2) The Secretary shall survey and gather data, on a continuing basis, on—

(A) the number and distribution of nurses, by type of employment and location of practice;

(B) the number of nurses who are practicing full time and those who are employed part time, within the United States and within each State;

(C) the average rates of compensation for nurses, by type of practice and location of practice;

(D) the activity status of the total number of registered nurses within the United States and within each State;

(E) the number of nurses with advanced training or graduate degrees in nursing, by specialty, including nurse practitioners, nurse clinicians, nurse researchers, nurse educators, and nurse supervisors and administrators; and

(F) the number of registered nurses entering the United States annually from other nations, by country of nurse training and by immigrant status.

(3) Within six months of the date of the enactment of this Act, the Secretary shall develop procedures for determining (on both a current and projected basis) the supply and distribution of and requirements for nurses within the United States and within each State.

Report to Congress.

(b) Not later than February 1, 1977, and February 1 of each succeeding year, the Secretary shall report to the Congress—

(1) his determinations under subsection (a)(1) and the data gathered under subsection (a)(2);

(2) an analysis of such determination and data; and

(3) recommendations for such legislation as the Secretary determines, based on such determinations and data, will achieve (A) an equitable distribution of nurses within the United States and within each State, and (B) adequate supplies of nurses within the United States and within each State.

OMB review, submittal to Congress.

(c) The Office of Management and Budget may review the Secretary's report under subsection (b) before its submission to the Congress, but the Office may not revise the report or delay its submission, and it may submit to the Congress its comments (and those of other departments or agencies of the Government) respecting such report.

certain practice settings, and among nurses with certain specialized training. Through work experience and advanced training, nurses prepare for practice in various sectors of the diverse health care delivery system. For example, those whose skills equip them for specialized intensive care units are not likely to perform with equal effectiveness in community settings where assessment of health status and management of care are prime concerns.

In order to examine more closely these and other factors related to the adequacy of the nurse supply and to fill gaps in existing data sources, a national sample survey of registered nurses was conducted in September 1977 and the findings were reported in Nurse Supply, Distribution and Requirements. Third Report to the Congress: February 17, 1982 (USDHHS, Division of Nursing, 1982.) In terms of the aggregate supply, the Third Report anticipated continued growth in the registered nurse supply over the next 20 years, although at varying rates.

Comparisons were made between the two sets of requirements projections and the four sets of supply projections based on alternative assumptions regarding the number and types of graduates that might be available. The comparison of supply projections in relation to the historical trend-based requirements projections indicated a reasonable balance between the two for 1990. By the year 2000, however, requirements projections exceeded supply estimates in three of the four series of supply projections. Comparison of the supply projections with the criteria-based requirements projections was made only for the year 1990. This comparison showed that requirements would outstrip supply with the most serious deficit occurring in the number of nurses with advanced training. Noting that Federal support had been an important instrument in increasing the supply of registered nurses, the report urged States, the health care industry and the profession to assume a more prominent role in maintaining enrollments, subsidizing the costs of further increases, and instituting measures to improve the utilization of nursing personnel.

The fourth report to the Congress served the dual purposes of fulfilling the biennial reporting requirement and the congressional charge requiring the Secretary to report to the Congress on questions that had been the subject of a two-year study conducted by the National Academy of Sciences acting through the Institute of Medicine (IOM). Questions addressed in this study, mandated by section 113, Nurse Training Amendments of 1979 (P.L. 96-76), were: to determine the need to continue a specific program of Federal financial support for nursing education; to determine the reasons nurses do not practice in medically underserved areas in order to develop recommendations for actions that could be taken to encourage nurses to practice in such areas; and to determine the rate at which and the reasons for which nurses leave the nursing profession and develop recommendations for actions that could be taken to encourage nurses to remain or reenter the nursing profession, including actions involving practice settings conducive to the retention of nurses.

Findings from the fourth report were in general agreement with those of the IOM study regarding the overall balance between supply and requirements for registered nurses in 1990 and 2000. For this reason the report recommended that the Federal Government limit its future role in maintaining the nurse supply to areas amenable only to Federal intervention or to areas in which Federal actions could serve as a catalyst to the non-Federal sector. These included continued support for the preparation of teachers, administrators and clinical specialists who constitute a scarce resource and are key elements in improving the quality of education, practice, and the management of nursing services nationwide. Extension of the existing authority for the training of nurse practitioners was also recommended as a means of augmenting the quality of care for population groups with limited access to primary health care services.

Preparation of the fourth report was completed some months in advance of the 3-year phase-in of prospective payment for Medicare services, which began officially on October 1, 1983. Since nursing is a critical element of hospital care, the new payment system is expected to radically transform the practice of nursing not only in institutions but in all types of practice settings. Changes in practice will necessarily influence the type and level of preparation essential for providing care of high quality in the most cost effective manner. The effect that this fundamental change in payment for services will have on the health care delivery system, and on nursing in particular, cannot be fully assessed on the basis of experience to date. Findings from long-range studies under way will not be available for inclusion in this fifth report. However, there is sufficient empirical evidence of the impact of change on the delivery of nursing services in institutional and community settings to support initial conclusions regarding the future needs in assuring an adequate supply of well prepared nurses.

B. DEVELOPMENTS IN THE REGISTERED AND LICENSED PRACTICAL/VOCATIONAL NURSE SUPPLY

1. New Additions to the Nurse Population

Basic Nursing Education in the United States [1]

Registered nurses and licensed practical/vocational nurses are the two types of nursing personnel for which there are formal educational programs that prepare students for examination for licensure for nursing practice. (The licensed practical/vocational nurse will be called licensed practical nurse for the most part in the remainder of this report.) In some instances, certain types of nursing aides may take formal courses and, in some States, may be licensed to practice. For the most part, however, nursing aides are on-the-job trained and are not licensed personnel.

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[1] Data on basic nursing programs preparing for registered and licensed practical nurse licensure and their students come from annual surveys of schools of nursing conducted by the National League for Nursing (NLN, 1984, 1984, 1985).

There are three types of programs preparing graduates for licensure as registered nurses. As noted in table 10-1, as of October 15, 1983, there were 1,466 State board-approved programs in the United States.

Diploma programs, primarily 3 years in length and usually based in hospitals, were 19 percent of the total programs. Once the major route of entry for students into nursing, the 1983 total of 281 programs is the result of a steady decline in the number of diploma programs over a long period. In 1970 diploma programs numbered 636, almost half of the 1,340 basic nursing educational programs in existence.

Associate degree programs, primarily 2 years in length and located mainly in junior or community colleges, are the newest of the three types of programs. First established in the early 1950s, the number of such programs grew rapidly during the first two decades of their existence and has continued to grow since then. In 1983 there were 764 such programs, more than half the total number of programs.

Baccalaureate programs, the third type preparing students for licensure as registered nurses, usually require 4 years of education to obtain the degree. However, the actual length of the nursing educational program is dependent on whether students are admitted to the program in their freshman, sophomore, or junior year. Almost half of the programs are 4 years in length, admitting students as freshmen. The remaining programs are about equally divided between 2 and 3 years.[2] Baccalaureate nursing programs have been in existence since the 1920s and their number has grown throughout the period. In 1983 there were 421 basic baccalureate programs, 29 percent of the total nursing programs.

Although admissions to these RN nursing educational programs declined toward the end of the 1970s, the 1980s to date have shown increases in the number of new students. These increases were across the board in all three types of programs. Even diploma programs, which declined in number of programs, gained in the overall number of students admitted to the programs.

During the 1982-83 academic year, the most recent year for which data are available, there were 120,579 total admissions, a gain of 4.6 percent over the prior year. The largest gains during the period occurred in the associate degree programs. The 63,947 admissions to these programs represented a 5.6 percent increase over the prior year. Diploma programs had 19,368 admissions and baccalaureate programs, 37,264, during the 1982-83 academic year.

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[2] Included in the discussion of baccalaureate programs are entry level nursing programs leading to advanced degrees. As of October 15, 1983, there were three basic programs leading to a master's degree in nursing and one basic program leading to a nursing doctorate as the first professional degree.

As of October 15, 1983, there were 1,292 State board-approved practical nursing programs in the United States (see table 10-2). Practical nursing programs, usually 12 months in length, are based in adult vocational educational settings, although some are high school or high school extension programs. During the 1982-83 academic year, there were 61,453 students admitted to these programs. In a similar pattern to that seen for the students in registered nurse programs, there was a decline in the admissions to practical nurse programs in the latter part of the 1970s and an increase in the 1980s to date. The 1982-83 admissions reflected a 1.7 percent increase over the prior year.

There has been considerable interest in what it costs to educate students in these programs. However, such data are not readily available. A major problem in studying the cost of nursing education is that it is not carried out in free-standing schools; thus, expenses for certain facets of nursing programs are shared with other types of programs within the schools, making it difficult to isolate and assess the true cost of nursing education. Furthermore, schools do not maintain or consider these shared expenses in a uniform manner, thus hampering efforts to provide comparable data on all schools.

Some data are available on the cost to students in the form of tuition and fee charges. These charges vary widely, depending upon the type and location of the program. For baccalaureate programs in academic year 1983-84, the median annual tuition and fee charge was $1,261 in programs operated by public entities and $4,860 in private baccalaureate programs. About half of the baccalaureate programs were in publicly supported schools. Annual median charges in associate degree programs were $860 in the publicly supported programs and $4,061 in the privately supported ones; however, about 88 percent of the total programs were located in publicly supported schools. Differences in tuition charges for diploma programs were less marked. Publicly supported programs had a median annual tuition and fee charge of $1,742 and in the privately supported programs, the median was $2,099. Only 13 percent of the diploma programs were publicly supported. Some of the difference between the tuition charges in public and private schools may be due to the fact that the fees reported for publicly supported schools relate only to students who are residents of the State or the county in which the program is located. Presumably, nonresidents would have to pay a higher tuition fee than residents pay. In all cases, the charges were higher in the fall of 1983 than in the prior year. Taking all programs into account, the median charge rose about 13 percent.

Data were not available for tuition and fee charges made by practical nursing programs in the fall of 1983 at the time of this report. In the fall of 1982, the median annual tuition and fee charge in publicly supported programs was $798 in those programs charging tuition and $1,250 in the privately supported programs. Most practical nursing programs are publicly supported and about 15 percent of them did not have tuition charges.

Students in Nursing Education Programs

As of October 15, 1983, there were 250,553 students enrolled in nursing education programs preparing for licensure as registered nurses. About 44 percent of these students, or 109,605, were in associate degree programs. A total of 98,941, 39 percent of all the students, were in baccalureate programs, and 42,007,17 percent of the total were in diploma programs. Practical nursing programs had 55,446 enrollees as of October 15, 1983.

The latest data available from the National League for Nursing describing the composition of the nursing student body indicate that it is predominately female, non-minority. Data for the fall of 1981 show that 5.2 percent of the students in registered nurse programs and 4.9 percent of the students in practical nursing programs were men. Among those in registered nurse programs, 5.7 percent in associate degree programs and 5.0 percent in baccalaureate programs were men. Diploma programs were least likely to have men; only 4.2 percent of their student body were men.

Of all the students enrolled in registered nurse programs in the fall of 1981, 6.6 percent were black. Diploma programs were far less likely to have black students than were baccalureate and associate degree programs. Of those in diploma programs, 4.3 percent were black, in comparison to 7.1 percent of the baccalaureate students and 7.0 percent of the associate degree students. Almost 3 percent of registered nurse program students were of Spanish background, with baccalureate programs having the highest proportion among their total students (3.8 percent) and diploma programs, the lowest (1.1 percent). In addition, 1.4 percent of registered nurse program students came from American Indian or Oriental backgrounds.

Practical nursing programs were more likely to have minority students than were registered nurse programs. In the fall of 1981, 11.4 percent of practical nurse students were Black, 3.6 percent were from Spanish backgrounds, and 1.3 percent were American Indians/Orientals (Vaughn, 1982).

Graduations from Nursing Education Programs

Following several years of a decline in the number of graduates from programs preparing for registered nurse licensure, there was a slight increase in the 1981-82 academic year and a larger increase in 1982-83. The 77,408 graduates in the 1983 academic year represented a 4.5 percent increase over the number graduating the prior year. The increase came primarily from the associate degree programs, which graduated 41, 849 in 1982-83, 9.3 percent more than the prior year. Baccalaureate programs continued to show a decrease in the number of graduates.

Changes in graduation levels in all types of nursing education programs result primarily from changes in admission levels since completion rates are relatively stable. The number of graduates from generic baccalaureate programs has decreased in each of the last 4 years (from 1980-81 to 1982-83), although an increase in admissions is expected to result in an increase in graduations.

Since academic 1980-81, more than half the graduates each year have been from associate degree programs. It can be anticipated that this trend will continue in future years as admissions to these programs continue to represent the largest share of new students. While the number of graduations from diploma programs has increased slightly in recent years, it is probable that graduations will decrease in future years given the continual steady decrease in the number of programs.

In the 1982-83 academic year, there were 45,174 students graduated from practical nursing programs. As was true for the registered nurse programs, there were decreases in the number of graduates for several years, but in the year 1981-82 this trend was reversed. Tables 10-3 and 10-4 show State distribution of admissions and graduations to nursing educational programs.

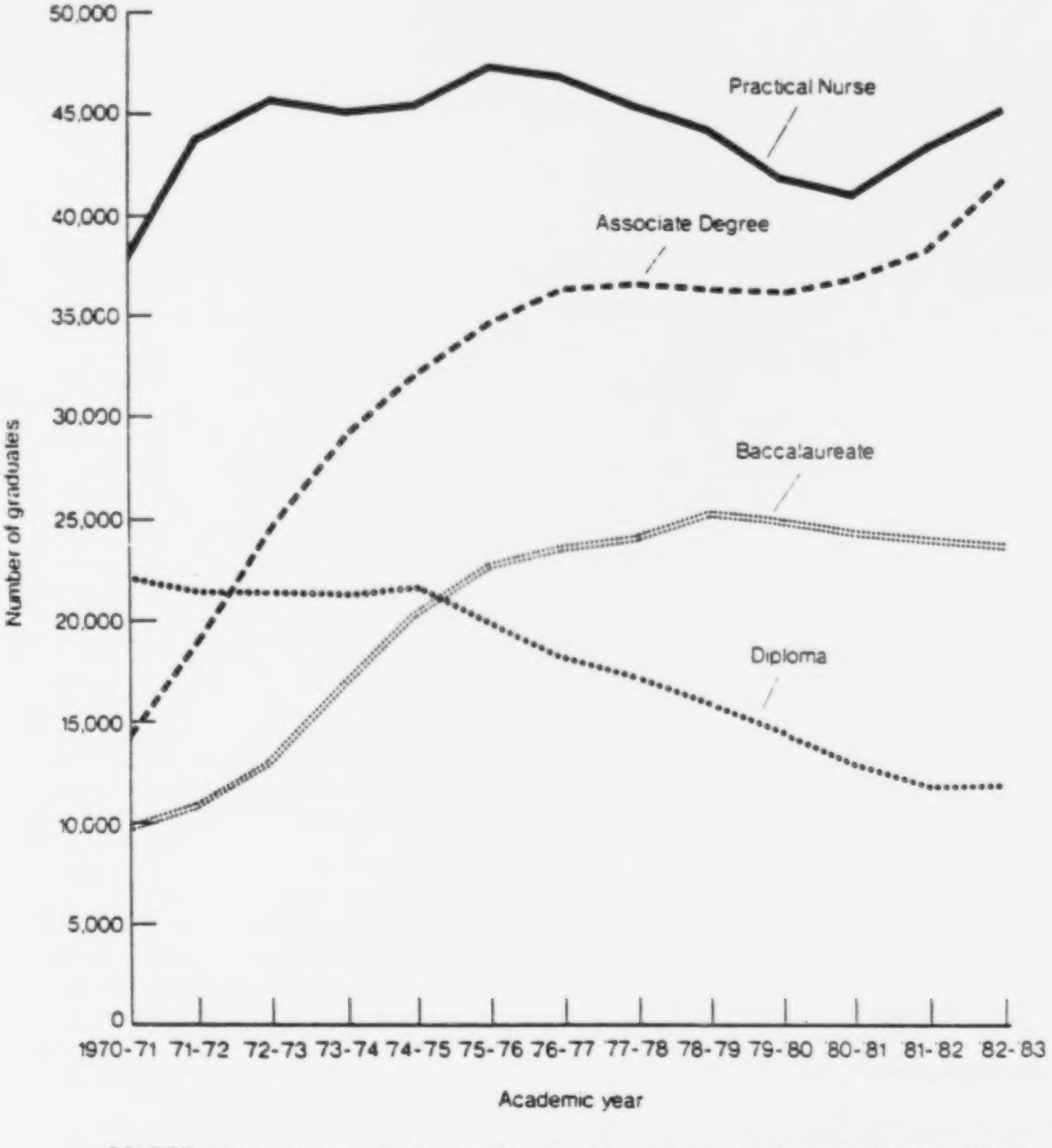
Issues in Licensure

All jurisdictions require completion of a nursing education program approved by the respective State board of nurse examiners as a prerequisite for taking the licensure examination. Graduates of all three types of nursing education programs take the same national licensing examination testing for safe practice.

With few exceptions, graduates take the licensing examination in the State in which they completed their nursing education program. Since each State determines its own passing score, nurses who choose to practice in a jurisdiction other than the one in which they were originally licensed, must apply for endorsement in that jurisdiction. The use of a national examination and similarities among requirements of State boards of nursing enable nurses to move freely from one jurisdiction to another.

Over the past 20 years, the profession has debated the issue of professional vis `a vis technical nursing practice, the level of education for each practice level and the need to administer separate examinations to test for each level of competency. Under this proposal, graduation from a program granting a baccalaureate degree, either initially or after completion of a diploma or associate degree program, would be the prerequisite qualification for professional practice. Provision would be made for individuals already holding licenses as registered nurses. Some States have moved toward developing an examination qualifying for professional practice to be administered only to baccalaureate degree graduates following the licensure examination. However, assumptions regarding supply and requirements in this report are based upon continuation of present licensure mechanisms.

Figure 10-1 - GRADUATIONS FROM BASIC NURSING EDUCATIONAL PROGRAMS PREPARING FOR LICENSURE, UNITED STATES, ACADEMIC YEARS, 1970-71 THROUGH 1982-83



SOURCE: National League for Nursing, Division of Public Policy and Research, Nursing Student Census, 1984; NLN Nursing Data Book, 1983-84, and National League for Nursing, State-Approved Schools of Nursing - LPN/LVN, 1984.

Licensure mechanisms for practical nurses are comparable to those for registered nurses. Completion of an educational program approved by a State board of nursing, or equivalent education so approved, is a prerequisite to taking a national examination administered by each State. Once licensed, a practical nurse may practice in other States by seeking endorsement. In recognition of licensed practical nurses' increasing responsibilities for patient care, the House of Delegates of the National Federation of Licensed Practical Nurses passed a resolution at its 1984 meeting to expand the current one-year training program to an 18-month program leading to an associate degree. The organization has launched a 10-year plan to implement this resolution. Assumptions in this report, however, are based upon the current licensure requirements.

2. Additions to the Nurse Population from Immigration of Foreign Nurses

A small number of the newly licensed additions to the registered nurse population come from foreign nurse graduates, licensed in their own country and subsequently licensed in this country. Changes in the immigration laws in the late 1960s made it possible to increase the flow of these nurses into the country. This flow was further stimulated by the availability of employment opportunities at that time which led to specific recruitment of foreign-trained nurses by United States employers.

Because occupational background data are not available on all individuals entering the country with visas unconnected to the occupational preference categories, a total count of registered nurse immigrants cannot be obtained. However, from the annual counts available from the Immigration and Naturalization Service, it would appear that the number of registered nurse immigrants has been decreasing since the mid-1970s. By far the largest number of immigrants have come from Asia but this count in Fiscal Year 1984 was less than half that of Fiscal Year 1976 and is a major factor in the decline in the overall total number of nurse immigrants (see tables 10-5 and 10-6).

Not all the nurses who emigrate to this country can obtain a license to practice here. To gain licensure, these nurses are required to pass the State board licensing examination administered to all applicants for licensure. Data from the National Council of State Boards of Nursing indicate that, in 1984, the passage rate was about 47 percent for the 6,471 foreign nurse graduates who took the examination for the first time, compared to a passage rate of about 89 percent for the 80,547 first-time candidates among U.S. graduates. The passage rate on retaken examinations for foreign nurse candidates (21 percent) was also lower than that for re-examinations for U.S. graduate candidates (52 percent).

It should be pointed out that not all graduates of foreign schools of nursing taking the examination are newly arrived in this country. In some instances they may have arrived well ahead of the date of their first application for licensure and are taking the examination or are retaking it because of prior failures. In other instances, they may have been licensed at one time by some State based on endorsement of the foreign license and are later required to take the examination because of changes in licensure requirements when they move to another State.

The Bureau of Health Professions in the early 1970s undertook a special study to examine the extent to which foreign nurses achieve licensure and the problems related to it (USDHEW, DN, 1976). Acting upon the results of that study, the American Nurses' Association and the National League for Nursing sponsored the creation of the Commission on Graduates of Foreign Nursing Schools (COGFNS). The COGFNS administers an examination both here and abroad designed to test the nursing knowledge and English proficiency of the foreign nurse graduate. Successful completion of this examination is now required by the Immigration and Naturalization Service before a preferential H-1 non-immigrant visa will be granted. A labor certificate, issued by the Department of Labor, is also required to obtain an immigrant occupational preference visa. Many State boards of nursing have also established requirements for the foreign nurse to have first passed the COGFNS screening examination before taking the State board examination. According to data issued by COGFNS, some 35,000 foreign nurses have taken or retaken the COGFNS examination since its inception in 1978. About 38 percent have passed. The Commission further indicates that, among COGFNS certificate holders known to be in this country, about 81 percent have also passed the State licensing examination.

In total, registered nurses who obtained their basic education in foreign countries are not a high proportion of the U.S.- registered nurse population. The November 1980 Sample Survey of Registered Nurses (Bentley, et al., 1982) estimates that 59,935 (3.6 percent of the 1.7 million total nurses) fell within that group.

3. Characteristics of the Licensed Practical/Vocational Nurse Population

According to a national sample study of licensed practical/vocational nurses (LPNs/LVNs), conducted by the Research Triangle Institute under contract with the Division of Nursing, BHPr, in November 1983, there were an estimated 781,506 individuals with licenses to practice as practical nurses in the United States (Jones, et al., 1984). About 3 percent of these, or 24,500, were men. Eighteen percent, or 140,800, were from racial/ethnic minority backgrounds. Blacks (non-Hispanics) in the practical nurse population numbered 103,500 while there were an estimated 18,700 Hispanics.

An estimated 539,463 were employed in nursing as practical nurses, 69 percent of the total number with current licenses to practice (see table 10-7). Almost three-quarters of those employed as practical nurses were working on a full-time basis. Those employed on a part-time basis were more likely to be found among the married nurses than among those who were never married or were formerly married. Thirty percent of the married employed LPN/LVNs were working on a part-time basis compared to 15 percent of the others. This was particularly the case for those married nurses with any children under the age of six. About 42 percent of these married nurses with young children who were employed were working part time.

The median age of the licensed practical nurse population was 38.6 years. Employed licensed practical nurses tended to be younger on the average than those who were not employed. The median age of employed LPN/LVNs was 37.7 while the median age for the others was 41.3. About one in four of the employed LPN/LVNs were under 30 years of age; about two-thirds were 44 years or younger.

An estimated 37,440 of the 781,506 with licenses to practice as practical nurses were also licensed as registered nurses. Therefore, almost 12 percent, or 28,640 of the 242,042 individuals with licenses to practice as practical nurses who were not employed in that capacity, were working as registered nurses. In addition, there were about 12,245 of those not employed as LPN/LVNs who were in other health-related occupations and 39,655 who were in non-health related occupations.

About 9 percent (22,344) of LPNs/LVNs who were not employed as practical nurses were actively seeking nursing employment. These individuals represented 2.9 percent of all those with licenses to practice as practical nurses. Some of those who were seeking employment as practical nurses were also working in some other occupation.

Aside from those who were seeking LPN/LVN employment or who were employed in non-LPN/LVN positions, there were an estimated 142,162 inactive LPN/LVNs. About 7 out of every 10 were married. Fifty-five percent had children at home and almost half were at least 50 years old.

In summary, the employment distribution of the licensed practical nurses as of November 1983 was as follows:

	Estimated Number	Percent
Total LPNs with licenses to practice as LPNs	781,506	100.0
Employed as LPNs	539,463	69.0
----------------	-------	-----
Employed in other occupations	82,701	10.6
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Licensed and employed as RNs	28,640	3.7
Employed in other health-related occupation	12,245	1.6
Employed in a non-health-related occupation	39,655	5.1
Type of employment not known	2,161	.3
Not employed	159,342	20.4
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4. Characteristics of the Registered Nurse Population

According to the latest estimate, there were 1,404,200 registered nurses employed in the United States as of December 31, 1983 (see table 10-9). A national sample survey, one in a series of studies of the registered nurse population, was conducted in November 1984 by Westat, Inc. under a contract with the Bureau of Health Professions. The data from that study will be available in late 1985. Therefore, the latest information available on the characteristics of the registered nurse population is from the second in the series, which was conducted in November 1980.

The November 1980 sample survey estimated that 1,272,851 registered nurses were employed in nursing, almost 77 percent of the estimated 1,662,382 with licenses to practice (see table 10-8). In the September 1977 sample survey of registered nurses, 70 percent of those with licenses to practice were employed in nursing (Roth, et al., 1978). Thus, the activity rate for registered nurses in 1980 was significantly higher than the rate for 1977. An examination of various data sources suggests that the gains made in the proportions of those currently licensed and employed are directly due to increasing numbers of nurses remaining in or returning to the nurse work force. The November 1980 survey estimated that about three-quarters of the 1.7 million in the registered nurse population were employed as RNs at least 60 percent of the time since they were graduated from their basic nursing education and most indicated they worked for at least 90 percent of the time.

The November 1980 data show a continuing increase in the number of men and the number of racial/ethnic minorities in the registered nurse population. The total number of nurses with racial/ethnic minority backgrounds in 1980 was estimated at 119,510, an increase of over 32,000 or 37 percent, over the number in 1977. In 1980 an estimated 45,060 men were among the registered nurse population, about 18,000 or two-thirds more than in 1977.

The 1980 population of registered nurses was somewhat younger than the 1977 population. The median age of RNs in 1980 was 38.4; in 1977 it was 39.8. Almost half of all registered nurses in 1980 had graduated from their basic nursing educational programs within the last decade. At each age level, the proportion of registered nurses who were employed in nursing increased significantly between 1977 and 1980. These increases were particularly evident in the mid-level age group, the thirties and forties, when, usually, some time is taken out for family responsibilities.

With the increase in the proportion of actively employed nurses among nurses at all age levels, there was a slight, but insignificant, increase in the proportion of employed nurses working part time. Given the higher overall activity rate, however, there was actually an increase between 1977 and 1980 in the proportion of all registered nurses with licenses to practice who were employed on a full-time basis. In 1977 less than half, or 47.5 percent, of the 1.4 million registered nurses were employed full time in nursing; in 1980 the count was over one-half, or 51.4 percent, of 1.7 million.

About 32,000 of the 388,500 registered nurses in November 1980 who were not employed in nursing were actively seeking nursing employment. These nurses represented 2 percent of the 1.7 million registered nurses. More than two-thirds of those seeking employment were looking for part-time work. About 75,700, including 6,500 who were looking for nursing employment, were employed in non-nursing occupations.

Apart from those seeking nursing employment or those who were employed in a non-nursing capacity, there were about 287,000 who were inactive in terms of employment. Most of these, 80.7 percent, were married and most had children living at home. About half of the total inactive nurses, 142,000, were married with children at home. Among the group not accounted for by the married persons with children, almost 118,000, or 41 percent of the 287,000, were at least 50 years old. Thus, at most, about 27,000 inactive registered nurses were both under 50 years of age and were not married with children at home.

5. Geographic Distribution of Nurses

Although the supply of both registered and licensed practical nurses has grown over the years in all parts of the country, there is still a disparity in their distribution among the various geographic entities within the country as measured by nurse-population ratios. The ratio of nurses per 100,000 population is used to examine the distribution patterns because of the large differences in population sizes. These ratios, however, are not a true measure of the nursing services provided to the population. The concentration of nurses in a particular area is dependent in part upon the types of facilities or organized service settings in which they can practice. Therefore, an appropriate evaluation of differences in services provided should take into account the facilities available to provide these services.

On a State-by-State basis, as can be seen in table 10-9, according to estimates of the registered nurse supply as of December 31, 1983, the ratio of employed registered nurses per 100,000 population ranged from 358 in Oklahoma to 1,300 in the District of Columbia and 1,040 in Massachusetts. The New England area had the highest ratio, 948, while the West South Central area had the lowest, 380.

The relative variation in the State ratios was somewhat higher for registered nurses than for licensed practical nurses. Data from the November 1983 National Sample Survey of Licensed Practical/Vocational Nurses provided estimates of employed licensed practical nurses per 100,000 population ranging from 119 in Alaska to 384 in Ohio. The Mountain area had the lowest ratio, 173, and the Pacific area the next lowest, 176. The

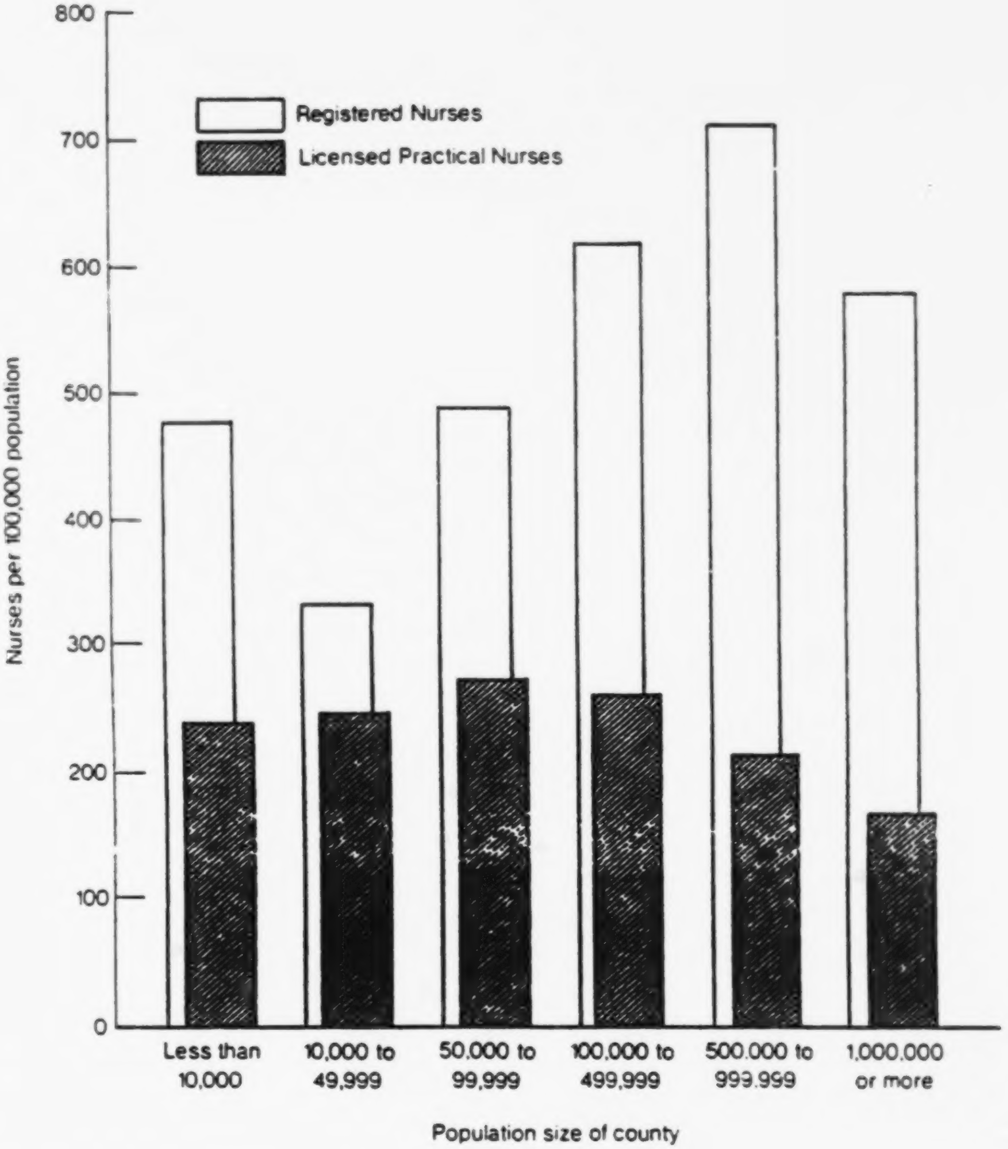
West North Central area, with a ratio of 280 employed licensed practical nurses per 100,000 population, and the East South Central area with a ratio of 278, were the regions with the highest ratios.

Along with differences found among States, the distribution within States also varies from area to area. A review of the distribution of nurses on a county level suggests that employed registered nurses are more likely to be located in those counties with high concentrations of population than are licensed practical nurses or the general population. According to data from the 1980 Sample Survey of Registered Nurses, about 45 percent of the registered nurses were employed in counties with at least 500,000 population. About 39 percent of the total resident population in the country reside in such counties while estimates based on the data from the 1983 licensed practical nurse sample survey indicate that about 32 percent of the LPN/LVNs were employed in settings located in such counties. The ratio of employed nurses to population in these counties for registered nurses was over three times more than that for licensed practical nurses. In the smaller size counties, the RN ratios were less than two times more than the LPN ratios.

Registered nurses with minority backgrounds were even more likely to be found in those counties with the largest concentrations of population than were all registered nurses. About 68 percent of the employed Black (non-Hispanic) registered nurses and 52 percent of the Hispanic registered nurses were in counties of 500,000 or more population. Black licensed practical nurses as well were also concentrated in such counties. Both Black and Hispanic registered and licensed practical nurses were most likely to be found in those areas with the heaviest concentrations of population of the respective racial/ethnic background. Thus, the ratios of employed Black registered and licensed practical nurses per 100,000 total population in those counties with the highest proportions of Black residents were more than twice the overall ratios of employed Black nurses per 100,000 population in the country. Similarly, the ratios of employed Hispanic registered and licensed practical nurses were more than twice the overall ratios for all Hispanic nurses in counties where the highest proportion of Hispanic residents were found. A comparison of the nurse-population ratios for all employed registered and licensed practical nurses indicates that the ratios were about the same in those counties with high concentrations of Black residents as for the country as a whole and somewhat lower in those counties with the highest concentration of population with Hispanic background.

The effects of the types of area health facilities on the concentration and distribution of nurses can be seen from an examination of the employment setting distribution of nurses in counties of varying population sizes. For example, in those counties with 1,000,000 or more resident population where the largest, most complex hospitals are likely to be located, about 71 percent of the registered nurses were employed in hospitals. In the smallest counties, those with less than 50,000 population, about 59 percent of the registered nurses were employed in hospitals. Conversely, about 10 percent of registered nurses employed in those smallest counties were

Figure 10-2-NURSE POPULATION RATIOS BY POPULATION SIZE OF COUNTIES IN WHICH THEY ARE EMPLOYED, 1980



SOURCE : Compiled from data collected in the National Sample Survey of Registered Nurses, November 1980, and the First National Sample Survey of Licensed Practical and Vocational Nurses -- 1983. County level population data are from the Area Resource File, Bureau of Health Professions, U.S. Department of Health and Human Services.

working in public/community health settings while only 6 percent of the nurses in counties with 1,000,000 or more population were in public/community health settings. However, when the population within each of those county groupings was taken into account, the supply of nurses was similar. There were 33 public/community health employed nurses per 100,000 population in the largest size counties compared to 35 per 100,000 population in the smallest.

Migration is another factor that would affect the number of nurses that might be in a given locality at any one point in time. The sample surveys have shown that registered nurses are more mobile than licensed practical nurses. Among registered nurses, those with baccalaureate degrees and graduate degrees would be more likely to be mobile than others. For both licensed practical and registered nurses, the younger nurses were more apt to move than the older ones.

6. Educational Preparation of Registered Nurses

Educational Background of the Registered Nurse Population

As of November 1980, the majority of the registered nurse population had received their basic nursing preparation in diploma programs (Bentley, et al; 1982). But a comparison between 1980 and 1977 data shows a significant decline in the proportion these nurses were of the total population, from 75 percent in 1977 to 63 percent in 1980. Furthermore, the 1980 study showed that two-thirds of the diploma graduates had completed diploma education more than 25 years before that date. Thus, it can be anticipated that diploma graduates will be a rapidly decreasing proportion of the total nurse population. Graduates from associate degree and basic baccalaureate programs will become increasingly larger segments of the population. At the time of the 1980 study, associate degree graduates accounted for 19 percent of the registered nurse population and basic baccalaureate graduates, 17 percent.

The education which registered nurses receive in the basic program preparing them for licensure provides the foundation for their practice. Once licensed, many nurses obtain additional education, either in formal academic programs providing preparation for advanced clinical, administrative or teaching positions or in continuing education programs providing preparation for specialized skills or new techniques.

The 1980 study estimated that about 13 percent, or 213,000 of the 1,662,000 registered nurses with licenses to practice had graduated from additional academic programs. Fourteen percent of the diploma graduates, 9 percent of the associate degree graduates, and 13 percent of the baccalaureate graduates had obtained additional academic degrees. Almost two-thirds of the diploma graduates who had gained additional education had as their highest degree a baccalaureate, and about 9 percent had associate degrees as their highest degree. Among the graduates from basic associate degree programs who had gone on for additional education, 82 percent indicated that their highest degree was a baccalaureate. Given these data, it is not surprising that 42 percent of those with master's or doctoral degrees had taken their initial nursing education in a baccalaureate program, even though only 17 percent of the total registered nurse population received basic nursing education in a baccalaureate program.

Taking into account all the formal nursing education programs from which the registered nurse population had graduated, both the basic and the education taken after RN licensure, it was estimated that the highest degree held by 18 percent of the nurses was an associate degree; 54 percent had diplomas and 22 percent, baccalaureates. Five percent, or 81,752, were estimated to have master's degrees and less than 1 percent, or 4,108, were estimated to have doctorates. The numbers of nurses with baccalaureate, master's, or doctorate degrees show sizeable increases since the September 1977 study. Baccalaureate nurses numbered 367,816 in November 1980, a 50 percent increase over the 245,608 estimated for 1977. Master's-prepared registered nurses increased 48 percent over 1977 when the estimated total was 55,096. The number of nurses with doctoral degrees increased from 2,304 in 1977 to 4,108 in 1980. Together, these three groups, however, represent less than 30 percent of registered nurses.

As shown below, among those in the nurse population who had master's or doctoral degrees, about one-third majored in education and 18 percent in supervision or administration. Forty-three percent, or 36,055 nurses, had advanced education in clinical practice areas. Over a quarter of these specialized in psychiatric/mental health and another quarter in medical/surgical nursing. The remaining subject areas specifically identified included community/public health, maternal-child, midwifery, and geriatrics/gerontology. Of these, the maternal-child and community/public health were most often mentioned.

	Estimated	
Primary focus	Number	Percent
Total	83,735	100.0
Education	28,091	33.5
Supervision/administration	14,823	17.7
Clinical practice	36,055	43.1
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Community/public health	4,457	5.3
Maternal-child	6,483	7.7
Midwifery	1,025	1.2
Geriatrics/gerontology	420	.5
Medical/surgical	8,777	10.5
Psychiatric/mental health	9,888	11.8

According to the information provided by the respondents to the 1980 survey, an estimated 167,230 registered nurses, or 10 percent of the total population, were enrolled in a formal educational program leading to an academic degree with a nursing or nursing-related major.[3] Among those whose highest education was a diploma, 8 percent were estimated to be attending school. Fifteen percent of those with associate degrees and 11 percent of those with baccalaureates were enrolled in formal educational programs.

Seven out of every 10 RN students were in baccalaureate programs and about one-quarter were working toward a master's degree. Three percent were attending programs leading to a doctorate and 2 percent were estimated to be attending associate degree programs. Over 80 percent of the enrollees were attending school on a part-time basis. Most were also employed in nursing, 65 percent on a full-time basis and 24 percent on a part-time basis.

The study shows that financial support for their schooling most likely came from their personal resources, such as savings, earnings, and their spouses's earnings. About 30 percent of the students received some financial support from employee tuition plans. Differences in the types of financial support used were noted for those both in graduate and undergraduate programs. About 10 percent of the doctoral students received some support from university teaching or research fellowships. Almost 18 percent of master's degree and 12 percent of doctoral students received some support from Federal traineeships, scholarships or grants, compared to only 3 percent of the baccalaureate degree students. Federally assisted loans also figured more prominently for master's and doctoral students than for baccalaureate students: 9 percent of master's and doctoral students, but only 4 percent of baccalaureate students, cited these loans as providing some financial support.

In addition to formal academic programs, continuing education programs provide a method for maintaining and improving competencies as a registered nurse. In the November 1980 study, continuing education was described as "...a formal learning program designed to update and increase knowledge and skills in health care." Study for an academic degree was excluded from this definition. Most RNs who were employed in nursing had participated in some type of continuing education during the year ending November 1980. About a third of those who were not employed at the time of the survey had also participated in continuing educational programs during that year. Over half (53 percent) of those who took continuing education had their employers pay for all or part of it. A majority of all students also personally paid for some or all of the courses they took.

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[3] Since this count far exceeds the number of enrollees in post-RN baccalaureate, master's and doctoral programs identified as nursing programs, it is assumed that a number of these individuals are either in programs which are nursing-related but have not been specifically identified as nursing programs or that a number of these persons are taking courses in degree-granting programs but are not formally registered to obtain the degree.

Programs Providing Advanced Nursing Preparation

A vital aspect of the nursing educational system is that segment which provides for master's and doctoral degrees. It is from these programs that nursing obtains its new leaders and teachers and those who have advanced clinical skills. Whether these individuals function in administrative leadership positions, as teachers of nursing in formal educational programs, as researchers investigating the theoretical nursing base or studying nursing phenomena to improve care provided, or as clinical specialists providing expert care, they provide the management structure and the guidance necessary to the sound practice of nursing throughout the health care system.

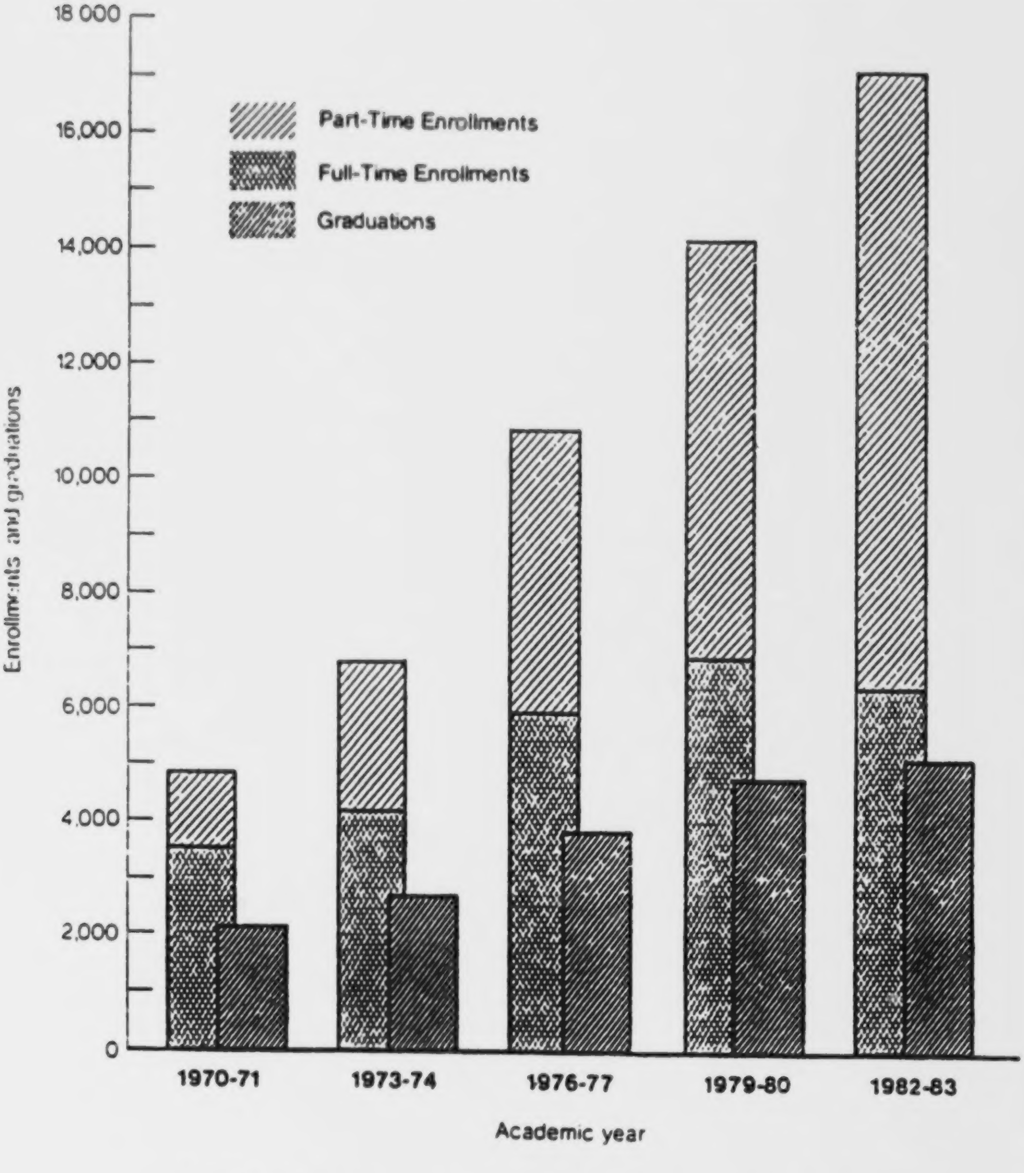
Annual data collected by the National League for Nursing show that the number of master's degree programs in nursing has more than doubled between 1970-71 and 1983-84, going from 73 to 154 (NLN, 1984). In the fall of 1970, 15 States were without masters's degree programs (ANA, 1970-71). In the fall of 1983, all States except New Hampshire and Vermont had at least one master's degree program. A new master's program funded by the Advanced Nurse Training Program will open in New Hampshire in 1985.

Total enrollments in master's degree programs show an even greater increase than that occurring in the number of programs. Between the fall of 1970 and the fall of 1983, enrollments increased fourfold, from 4,765 to 18,112. However, most of the increase in this period came from students attending these programs on a part-time basis. The number of full-time enrollments rose from 3,529 in the fall of 1970 to a high of 7,306 in the fall of 1980 and subsequently declined to 6,476 in the fall of 1983. Part-time students, on the other hand, went from 1,236 in 1970 to 11,634 in 1983. Thus, in 1970, full-time students were 74 percent of the total enrollment, while in 1983 they were only 36 percent of the total.

The dramatic increase in part-time students, coupled with a much slower growth rate in the number of full-time students, are reflected in the trend apparent in the number of graduations from master's degree programs. Master's degree graduates in the 1982-83 academic year, the last year for which data on graduates were available, numbered 5,039. In 1970-71, there were 2,082 graduates, showing an overall growth rate in the period of about half that of total enrollments. In fact, the number of graduates in 1982-83 is less than the 5,149 who graduated in 1981-82 despite the continuing large increases in total enrollments.

Not only has there been significant change in the number of master's degree programs and students in recent years but there have also been changes in the functional areas of study emphasis. The majority of those graduating in 1970-71 specialized in teaching or administrative management with almost 40 percent of the total graduates specializing in teaching. Seven out of every 10 of the 1982-83 graduates, however, specialized in advanced clinical practice areas. In 1970-71, 42.5 percent of the graduates had majored in advanced clinical practice areas.

Figure 10-3 - FALL ENROLLMENTS AND GRADUATIONS OF REGISTERED NURSES IN MASTER'S DEGREE PROGRAMS IN THE UNITED STATES DURING SELECTED ACADEMIC YEARS, 1970-71 THROUGH 1982-83



SOURCE : National League for Nursing, Division of Public Policy and Research, Nursing Student Census, New York, 1984.

When developing graduate level curricula, the nursing education system has consistently responded to the changing health care needs of the Nation; to the requirements for nursing care exhibited by various population groups, including the acutely and chronically ill, those with developmental disabilities, and the elderly; and to advances in technology that can both facilitate and change nursing practice (McCloskey and Grace, 1981; Diers, 1985). In the past, nurses were prepared at the baccalaureate level for advanced practice positions, as managers of nursing services and as teachers for some levels of nursing education. As the knowledge base and technology for advanced practice increased, there was increasing realization that baccalaureate preparation would no longer be sufficient for employment in positions that require mastery of complex content, sophisticated tools and use of complicated data bases. The profession, recognizing these changes, developed master's programs to educate nurses for specialty practice in a number of clinical areas as well as nursing administrators and educators. These programs were designed to build on the generalized nursing content taught at the baccalaureate level.

By the mid-1960s most of the master's programs had a major emphasis on advanced clinical practice with supporting preparation as teachers or managers of nursing services though the number of these programs was small. Graduates of these programs filled clinical specialist and management positions in community/public health and acute care settings and teaching positions in nursing education programs. The principal employers of advanced nurse specialists were schools of nursing and hospitals. Major emphasis at this time was on developing strong clinical master's programs.

By the 1970s, there was a growing interest in better preparation of nurse managers and administrators, resulting in the development of a stronger focus in nursing administration in some master's programs. This strengthening of educational programs has occurred through the development of new majors and minors in this area of specialization. Separately, preparation of nurse educators has been influenced by the general requirements of academic settings in which nurse faculty worked as well as by trends within the profession itself. Early master's programs prepared nurse educators in the art of teaching in the belief that these individuals already had a strong knowledge of nursing gained through clinical practice. With the development of nursing science and the integration of advanced technologies into the clinical master's programs, a change has occurred in programs that prepare nurse educators. A consensus seems to have developed within the academic community that teaching in a professional discipline requires a background in the specialized content to be taught. This content is provided at the master's level in nursing. During the past two decades, as the mainstream of nursing education has moved to collegiate level programs, the doctoral degree, already required of most other disciplines, increasingly has become a requirement for nurse faculty in these settings.

There has been considerable growth in the number of master's and doctoral programs in nursing science since the beginning of Federal support for advanced nurse training in 1975. New master's programs have been established, existing ones expanded, and substantial increases in enrollments have occurred. Program content in these new and expanded programs has emphasized high priority clinical areas such as gerontological, perinatal, and community health nursing, primary care, home health, nurse-midwifery, rehabilitation and care of the chronically ill. Each of these programs incorporates health promotion and disease prevention principles. Home health care enables full integration of the family into health care of individual members and facilitates the carrying out of health teaching and assessments by nurses when providing care in the home (Mundinger, 1983). Primary care is a particular area of advanced practice that has developed into a specialized practice area and is frequently offered as an option within other specialty areas of clinical graduate programs. Nurses with these competencies have been clearly demonstrated to have more satisified clients, provide more cost effective care and have better outcomes from their practice (Fagin, 1982).

In addition to the advanced clinical areas, there has been considerable growth in programs for the preparation of nurse managers and administrators. Nurses are now educated for middle and executive management practice in a variety of nursing service settings. The purpose of these programs is to prepare effective nurse managers who are able to assess the clinical environment, manage people and integrate clinical and organizational decisionmaking. In recent years, as the health care industry has expanded and become more complex and has experienced growing economic constraints, financial management and ethical decision-making content have become integrated in these programs. Educational programs build on available faculty expertise, resources for practice sites, role models and entering student interest and competence in deciding on the level of the management focus within the curriculum. Some programs educate nurse managers for both levels of management practice, some for only one. Nurses prepared for middle management usually also have advanced clinical practice within their programs because it is at this level of management that nurses are increasingly required to blend these two nursing specialties.

As was the case for the master's degree programs, the number of programs in nursing education departments providing doctoral degrees has increased significantly. In the fall of 1970, there were 6 programs with student enrollment. In the fall of 1983, there were 27 such programs and the National League for Nursing reported in 1984 that 36 schools without doctoral programs plan to offer programs in the future (NLN, 1984). The rapid increase in the number of programs to date started in the latter part of the 1970s. Enrollments, too, have shown significant increases during this period, from about 500 doctoral students in the mid-1970s to 1,495 in the fall of 1983. Graduations, however, which are dependent upon both course work and considerable independent study, do not show a consistent trend from year to year. On an overall basis, the number of graduates has increased. However, the rate of increase is far less than the one shown for enrollments. In academic year 1982-83, for example, there were 139 graduates, only 2 more than the year before in which 137 were graduated.

A study conducted in 1979 by the American Nurses' Association under a grant from the Bureau of Health Professions provides some insight into the educational preparation of nurses who are doctorally prepared and the evolution of this education (ANA, 1980). Analysis from the 1,964 respondents to the survey questionnaire indicated considerable diversity in types of doctoral education. Before 1965, the Ed.D. was the most common doctoral degree earned by nurses; since that time the number of nurses earning the research degree (Ph.D.) had increased steadily to constitute one-half of all those who had completed doctoral study.

The shift from Ed.D. to Ph.D. as the degree of choice followed the establishment in 1962 of the federally supported Nurse Scientist Training Program designed to finance research training at the doctoral level in basic science departments or disciplines related to nursing. Currently, most nurses seeking doctoral degrees enroll in programs awarding the degree in the field of nursing. Most of these nursing programs offer the Ph.D. degree. The Doctor of Nursing Science, a professional degree, has also been awarded since the early 1960s, and the number of graduates from programs offering this degree, although not large, has shown a fairly steady increase. The shift toward doctoral programs in nursing parallels the profession's recognition that a solid and substantial body of nursing knowledge is being developed, based on a foundation in the social, behavioral and biomedical sciences as well as the educational and organizational fields (Howard and Knofl, 1981). A small number of nurses held other degrees such as the Dr.P.H., Sc.D., and D.P.A.

The growth of doctoral programs has highlighted the necessity of having a cadre of established faculty who are seasoned researchers in place before the program opens. The increase in doctoral programs has stimulated many nursing faculty groups to rethink the purpose of master's level education, resulting in a tendency to shorten the length of some programs from 2 years to 3 semesters or 1 calendar year. This change represents faculty decisions that master's education in nursing no longer results in a terminal degree. Additionally, schools that have doctoral programs or are developing them have tended to integrate both master's and doctoral levels into one graduate program with two exit points.

The newly developed doctoral programs build on the specialized base at the master's level to enable the development of nurse experts in clinical research and nursing science. Graduates are prepared to conduct nursing research and for advanced practice, to teach in collegiate nursing programs, or to administer complex nursing services. It has been recognized that considerable time will be needed for universities offering nursing doctorates to build their capacities to prepare greater numbers of quality graduates likely to devote their careers to teaching and research (IOM, 1983, p.137). The recent growth in this level of program reflects this capacity building. Planning and implementation of all but a few of the doctoral programs begun since 1975 have been supported by the Federal Government.

The Institute of Medicine's 1983 study on nursing and nursing education recommended an expansion in programs at the graduate level to assist in increasing the rate of growth in the number of nurses with master's and doctoral degrees in nursing and relevant disciplines and cautioned that Federal support for doctoral level programs should be targeted primarily to strengthen existing programs in nursing, not to encourage the proliferation of new and possibly weak doctoral offerings. A national conference was held in 1984 to examine the growth and to develop a consensus about quality indicators for doctoral programs in nursing. The purposes of the conference, which was supported by the Division of Nursing, were to reach consensus regarding issues of quality in doctoral programs in nursing; to define areas in the newly developing doctoral programs in which quality control is critical; to develop statements of criteria for assessing quality; and to identify resources and extra-university relationships crucial to the operation of such a program.

In addition, participants addressed criteria for assessing the adequacy of the nursing base for carrying out substantive research, guidelines for readiness of faculty to guide and supervise research by doctoral students, criteria for determining the strength of the cognate fields in relation to the doctoral study and research in nursing, and the appropriate balance between the cognate field and the professional discipline. The report of the proceedings of the conference (AACN, 1984) describes the purpose of doctoral education in the development of nursing knowledge and indicates that the primary emphasis of doctor of philosophy programs is research and creative scholarships while the professional doctoral degree (D.N.S.) emphasizes advanced clinical practice with integration of research to improve nursing care. A total of 45 quality indicators for the areas of faculty, programs of study, resources, students, and program evaluation were agreed upon by the group of nursing deans and senior doctoral faculty who were present. The proceedings are currently being reviewed by all existing doctoral programs and those about to open to complete the consensus development. Final decisions will be disseminated by the American Association of Colleges of Nursing.

C. THE NURSING WORK FORCE

1. Summary of Current Developments in Practice Settings

The health care delivery system in this country is undergoing significant changes, more so now than at any other time in the recent past. An in-depth discussion of these changes is beyond the scope of this report, but there is little doubt that they will influence nursing practice in the future. One of the major changes is in the financing of health care. The potential impact of this change is expected to be enormous for the providers, the payers and the patients (Anderson, 1985). Numerous reports already suggest that the prospective payment system and other cost containment policies are having an effect. Hospital admissions and patient days are down and these trends are expected to continue. Patients in hospitals are sicker and require highly specialized intensive care. With advances in technology being integrated into the daily care of patients, it is predicted that nurses will be challenged to do more with less in an environment that is demanding, stressful and becoming progressively more limited in its resources. The impact of these trends on employment opportunities for nursing is still uncertain because, as the number of patients in hospitals decline, the acuity level of patients increases.

While patients in hospitals tend to be sicker, they are staying for shorter periods of time. The pressure to control costs has led to efforts to discharge patients earlier. The technological advances which have affected the level of care in hospitals have also made significant changes in the kind of care provided in the home. It is no longer unusual for home care patients to require highly specialized care. Community health nurses and home care nurses are now taking care of clients on respirators, dialysis machines and hyperalimentation. As a result of these changes, the demand for home care services has increased and home health nurses are being challenged to provide a level of care previously only given in hospitals.

Associated with the shift to out-of-hospitals care, is the corresponding increase in ambulatory services and the development of new and alternative delivery settings such as: surgicenters, diagnostic centers, hospices and HMOs. The growth in these types of settings is significant and is expected to continue, especially for HMOs. Although the impact on requirements for nurses in these settings is unknown at this time, it is speculated that these expanding areas will require more nurses. HMOs have been identified as potential growth markets for nurse practitioners and nurse midwives.

Some of the traditional practice settings such as nursing homes and extended care facilities are also undergoing changes. The clients in these settings have more chronic health problems, are older and tend to have fewer resources. In the past, efforts to move the elderly and chronically ill back into the community have met with varying degrees of success, but today there seems to be a renewed commitment and a strong movement throughout this country to returning patients to their homes and maintaining the elderly in their homes as long as possible. As a result of this trend and commitment, employment opportunities for nurses in community-based programs for the elderly are expected to increase even more in the future.

Another change expected to affect nursing practice in all settings is the increased emphasis on collaboration between nursing education, practice and research. Increasing collaboration has been identified from both within and outside of the profession as an urgent need in nursing. Because of this emphasis, a recent expert panel was convened to consider the issues and problems related to increasing collaboration in all settings and to develop recommendations for the Federal Government as well as for other public and private sectors (USDHHS, 1985).

The overwhelming majority of nursing personnel are employed in institutional settings (see tables 10-10 and 10-11). The November 1980 National Sample Survey of Registered Nurses showed that about three-quarters of employed registered nurses were in hospitals, nursing homes or extended care facilities (USDHHS, ODAM, 1983). Comparable data on licensed practical/vocational nurses from the First National Sample Survey of Licensed Practical/ Vocational Nurses: November 1983, (USDHHS, DN, 1984) indicate that about four out of five employed LPNs were in such settings. Most positions for ancillary personnel, such as nursing aides and attendants, are in hospitals and nursing homes or other extended care facilities.

Hospitals

Hospitals are the foremost employer of the 2.8 million nursing personnel in the country. Approximately 6 out of 10 nursing personnel, or 1,667,404, were employed in hospitals in 1983, the latest year for which there are counts of hospital personnel (see table 10-12). These individuals represented 40 percent of the 4.2 million total personnel employed in hospitals. More than half the nursing personnel in hospitals were registered nurses, 18 percent were licensed practical/vocational nurses, and 27 percent were ancillary nursing personnel (nursing aides, orderlies, attendants, operating room technicians, and others) (AHA, 1984).

Eighty-seven percent of hospital nursing personnel were employed in community hospitals (non-Federal, short-term general and other special hospitals whose facilities and other services are available to the public). Community hospitals are more likely than other types of hospitals to employ licensed practical nurses. Almost 92 percent of registered nurses were employed in community hospitals, along with 90 percent of licensed practical nurses, compared to 76 percent of ancillary nursing personnel.

In the 1981-83 period there was an almost 3-percent increase in the total employees in community hospitals. To some extent, this increase is apparently related to a greater availability of personnel since the budgeted vacancy rate declined from 4.2 percent in 1981 to 3 percent in 1983. The vacancy rates for registered nurses also declined in that period but still remained greater than those for all hospital personnel. In 1981, the vacancy rate for registered nurses was 7.6 percent while in 1983, it was 4.4 percent. The total number of community hospital full-time equivalent positions for registered nurses in 1983, including both the number of full-time equivalent employed and the budgeted vacant positions, was 729,740; 7 percent higher than the 680,881 full-time equivalent positions for registered nurses in 1981. Taking vacant positions into account, the total licensed practical nurse positions in community hospitals in that period declined by 5 percent, from 247,892 in 1981 to 236,374 in 1983. A gain of 4 percent was noted for the ancillary nursing positions, from 289,011 to 301,019. For the most part, vacancy rates in budgeted positions showed decreases throughout the country between 1981 and 1983. The southern area of the country continues to show the highest vacancy rates for registered nurses as it did in 1981 with a rate of 5.4 percent in 1983 compared to 9.1 percent in 1981 (see table 10-13).

Since the latest available comprehensive data on hospital personnel is for 1983, the impact that the newly instituted prospective payment system for Medicare may have on the employment of nursing personnel is not captured in the data presented here. This impact may come from two different influences resulting from the new payment system. First, a decrease in admissions and or the length-of-stay of the patient, resulting in a decrease in the total number of patient days for which nursing personnel are required. Second, the decrease in the length-of-stay will result in patients being in hospitals only for those particular days they need the type of care provided by an inpatient facility. Thus, the nursing hours required per day for each patient may increase as patients need a more comparable level of services on each day of their stay, including teaching regarding care following discharge. The types of services required on a more sustained basis may also increase the level of the skill mix among the required nursing personnel.

Taking all nursing personnel into account, whether supervisory, administrative or direct patient care staff, in 1983, there were 141 full-time equivalent nursing personnel per 100 patients in community hospitals; 57 percent were registered nurses, 19 percent were licensed practical nurses, and 24 percent, ancillary nursing personnel. The 1983 data reflect the trend toward both the growth in numbers of nursing personnel and in the skill level of personnel. In 1981, there were 131 full-time equivalent nursing personnel per 100 patients in community hospitals; 55 percent of whom were registered nurses, and 20 percent, licensed practical nurses. This suggests that community hospitals are caring for patients with more complex problems requiring more skilled nursing care.

While complete data for 1984 are not available as yet, information from two American Hospital Association survey sources suggest a decrease in the number of patient days in 1984 over 1983. Both the results of the National Hospital Panel Survey, which collects data from a sample of community hospitals selected to be representative of the total, and the Monitrend study, which summarizes data developed from an administrative survey in which community hospitals choose to participate, indicate a decline in admissions to hospitals and in patient length-of-stay. The Panel survey does not provide any data on nursing personnel. The Monitrend study does contain some data on nursing hours. Based on a comparison of the median paid nursing hours per patient day for June 30, 1983 and 1984, the data suggest that some increase in those hours took place during that period. Based on the data provided for medical-surgical, nonintensive care units, it would appear that there may have been an increase in the proportion of the total nursing hours per patient day that was provided by registered nurses in that period. Data on the skill mix of the nursing personnel are not provided in other areas of the survey.

Questions about the adequacy of the approach within the diagnostic related groups, the method used in the Medicare prospective payment reimbursement system, to measure nursing care resource requirements and, thus, to reimburse nursing costs adequately have been raised by a number of groups. Most recently in a report to the Secretary, the Prospective Payment Assessment Commission, established as an independent group to analyze the prospective payment system and make recommendations to improve it, indicated that the method used to allocate nursing costs within diagnostic related groups, which assumes that every patient uses the same amount of nursing resources per day, may have introduced serious inaccuracies. They further hypothesize that if improvements were made in measuring nursing resources use, it may minimize the "need perceived by some to adjust the system otherwise for severity of illness" (PPAC 1985, p.55).

Decisions about questions such as those raised above can have a material effect on nursing resources hospitals may establish which will affect the number of nursing personnel in hospitals. These questions are first being explored and only the initial reactions to this new reimbursement system can be measured at this time. Furthermore, the system is not fully in place yet. It is probable that it will take several years before adequate judgments can be made of the overall results on the employment of nursing personnel in hospitals.

Another factor which might affect the number and skill mix of the hospital nursing staff is the type of nursing care delivery system used. A 1983 hospital nursing personnel survey conducted by the American Hospital Association which collected data on staffing and registered nurse employment conditions from a sample of community hospitals provided some insight into that area.

The study indicates a wide diversity in the approaches to nursing care systems. About one-quarter of the hospitals indicated that no one specific delivery system was used for most of their inpatients. In response to the question asking for the percent of the hospital inpatients who were cared for under various systems, the largest single group of the hospitals, about 4 out of every 10 indicated that at least 75 percent of their inpatients were cared for under a team nursing delivery system. Team nursing was described as the "provision of nursing care for a group of patients in which a registered nurse team leader directs and supervises a group of nursing personnel." While this approach to nursing was indicated far more frequently than any other in all parts of the country, it was least likely to be indicated as the approach used for most of the patients in the northeastern sector of the country. Another approach, functional nursing, in which the provision of care is accomplished through nurses being assigned specific tasks (e.g., one might only take temperatures while another might give out medications), was used for at least 75 percent of the patients in about 9 percent of the hospitals. This approach was more likely found in the southern part of the country than in other areas.

About 25 percent of the hospitals used some type of "primary nursing" to provide nursing care to most of their patients. In the American Hospital Association study, data were solicited on the following approaches to this form of nursing care: total patient care described as "Provision of patient care whereby each of the nursing staff is assigned to give complete care to a group of patients during a given shift" (reported by 13 percent of the hospitals as covering most of their patients); modular nursing described as "Provision of patient care in which a primary nurse-to-patient relationship exists for a group of patients in a given location "(reported by 5 percent of the hospitals); and primary nursing described as "Provision of patient care in which a registered nurse assumes responsibility for all nursing care provided to a group of designated patients throughout the duration of their hospitalization" (reported by 7 percent of the hospitals).

The primary nursing method of clinical practice has increased autonomy in practice, participation with other providers in clinical decisionmaking and full responsibility for implementing the nursing process for a group of patients. This is the most integrated method of nursing practice with full delegation of authority to the primary nurse and strong collegial relationships for support as requested. It was the single most frequently identified practice methodology used by hospitals identified by the American Academy of Nursing in its study of magnet hospitals in that they are good places to practice nursing and they have an ability to recruit in a competitive situation (American Academy of Nursing, 1983). Primary nursing as a method of nursing practice has been clearly linked to improved clinical decisionmaking but its successful implementation requires increased clinical knowledge and competence and the availability of a sufficient number of qualified professional nurses (Brown, 1981). It is a system of nursing care delivery that usually includes responsibility and accountability by an individual nurse for a caseload of patients, an organized system of communications among care givers, and decentralization of authority to allow for substantial autonomy of the primary nurse.

A descriptive study of primary nursing practice in six hospital settings has recently been completed (USDHHS, DN, 1982). This study has shown that the phases of development an institution goes through in successfully implementing primary nursing leads to a model of professional nursing practice when fully completed. The study also demonstrated that changes are necessary in the entire patient care system and that the style of leadership of top management and the head nurse is crucial to successful implementation of this professional nursing practice model.

Further analysis of the study has identified seven key organizational variables of a nursing service and demonstrated how they change following the introduction of primary nursing (Deiman, Noble and Russell, 1984). These variables included impetus to change; organizational configuration, leadership models, and authority structure of the nursing department; knowledge utilization pattern of staff and management; staff performance evaluation procedures and measures; nursing department locus of control for decisionmaking and planning; and control of information sources. These variables changed considerably with the implementation of primary nursing to the point that when it was fully integrated as the method of practice, a model of professional nursing practice emerged. In this practice model, the organizational configuration of the nursing department is designed to continually support and reinforce primary nursing. This results in the implementation of the primary nursing philosophy and uniform standards on all nursing units, and the power and authority within the nursing department being redistributed to the point of implementation of a collaborative leadership model with a shared value in professional growth of all nurses. The nurses in a setting using this model establish nursing as a professional entity within the organization, and the clinical staff impose goverance standards on themselves, with primary nurses selecting their patients and choosing associate nurses who will be responsible for carrying out the nursing plan in the absence of the primary nurse.

Staff performance evaluation includes peer review using measures focused on clinical expertise. Hospitals with a model of professional practice must be committed to the value of the practitioner at the bedside, and individual initiative and professional accountability must become the basis of measuring performance with rewards in keeping with proven competencies.

The establishment of a professional model of practice through the implementation of primary nursing provides a means for nursing departments that wish to provide their nursing staff with more authority while increasing individual nurses' accountability for their practice. Some nursing departments are moving to increased self-goverance with plans to grant staff privileges to nurses who wish to practice in that setting. Accrediting groups are placing more emphasis on planning and documenting care, teaching patients effectively, developing quality assurance programs and incorporating discharge planning (Homan, 1980). The standards of the Joint Commission on Accreditation of Hospitals (1983) require that the nursing department be organized to meet the needs of the patients for whom services are provided, that each nursing department set up a scope and standards for practice, determine practice privileges and implement the nursing process. The model of professional practice has the features necessary to meet these requirements and it offers quality nursing care, cost effectiveness and staff nurse job satisfaction (Burn and Tonges 1983).

Nurses and nurse administrators are deeply involved in developing methods to assure that quality care will be provided with fewer resources in shorter periods of hospitalization with appropriate transition to out-of-hospital care. Changes in practice are being introduced to accommodate rapid advances in health care delivery, medical technology and knowledge of the basic sciences. Aydelotte (1983) notes that many of these changes increase the costs of personnel and equipment instead of reducing them and that new technology often creates higher levels of acuity, thereby increasing the requirements for professional and technological care. Patients come to the hospital for two reasons: the availability of high technology equipment and services; and high quality nursing care.

The changing hospital environment has influenced the restructuring of nursing services, the realignment of nursing administrative priorities, the reevaluation of nursing department goverance, choice of nursing practice methodology, priorities in care delivery and the information and knowledge needs for decisionmaking (Coleman, Dayanic and Simmons, 1984; Grazman, 1983). Increasing requirements for nurses to absorb additional functions in their practice, to prove the effectiveness of their practice and to demonstrate the cost effectiveness of their care have led to greater interest in nursing research on clinical and care delivery problems. A small but growing number of nursing departments in hospitals have opened nursing research units staffed by well prepared nurse researchers who are able to lead the nursing staff in the identification of researchable problems, development of protocols and acquisitions of funding (Brown, et al., 1984; Lancaster, 1984; MacKay, et al., 1984; Anderson, et al., 1985).

Clinical decisions are increasingly being made on the basis of what will provide the most effective outcome with the least cost (O'Conner, 1984). The management and practice of nursing are rapidly changing as issues of cost containment, ethics, quality, and marketing are examined. Nurse administrators and researchers are now involved in developing valid and useful means of separating out the cost for nursing services from the basic daily hospital cost charged to a patient (Thompson, 1984). Historically, the cost of nursing services has not been separated from room or other charges. Neither patients nor the public, consequently, are aware of the cost of nursing care or of the differences in cost between intensive and general hospital care. There have been several studies to examine methods for costing nursing services but none has yet yielded a model that can be used across hospitals (Curtain, 1983; Booth, 1985). Most methods use a data base derived from patient classification systems and most of these systems have been developed to meet the unique needs of nursing services within individual hospitals.

The impetus to examine the cost of nursing services comes from the belief among many in hospital management that the current reimbursement system will require costing of nursing services in order to make careful budget decisions. Two States have enacted legislation relative to nursing costs: The State of Maine requires that nursing care costs be identified on a patient bill and the State of New Jersey will require a costing system for nursing as of 1985. The need to examine the cost of nursing services has brought into focus the increasing requirement that nursing administrators and middle managers have competence in financial management and budget planning in order to advise and appropriately participate in decisionmaking when downsigning or shifting of resources become necessary. Nurses in leadership positions in hospitals can assume a crucial role in making necessary management decisions within an ethical framework that effectively preserves the quality of the care provided (DeJoseph, Petree and Ross, 1984; Mason and Daugherty, 1984; McClain and Selhat, 1984; Staley and Luciano, 1984; Sovie, Tarcinale, Van Putee and Stunden, 1985).

Recently a number of acute care settings have instituted a variety of approaches to the blending of teaching, practice, and research responsibilities, and they have developed model roles whereby a nurse can function simultaneously as teacher-practitioner, as teacher-researcher, or in all three roles (Hollshwander, Kinsey and Paradowski; 1984). These combined roles enable a pattern of nursing care that emphasizes the promotion of health and the prevention of illness, with a concomitent concern for the quality of life. The common threads among the new roles are the concern for better care through improved practice and education, the greater ability to expedite change within the health care delivery system, the necessity for strong administrative support to achieve the potential of these roles, the advisability of variability in the types of appointments, and the benefits of access to colleagues who represent a variety of clinical interests. The institutions that have nurses in these combined roles are frequently in large metropolitan university medical centers where both nursing education and service components exist within the same settings and where there is a significant pool of nurses with baccalaureate preparation. This pool facilitates the development and appropriate utilization of nursing specialists in improving clinical services and in facilitating clinical research.

Nursing Homes and Extended Care Facilities

These types of facilities providing care to a resident population of 1,378,702 are the second largest employer of nursing personnel. Of the approximately 667,000 who work in these facilities, 12 percent are registered nurses, 16 percent, licensed practical nurses, and 72 percent nursing aides. In terms of full-time equivalents in 1982, the ratio of total nursing personnel per 100 residents was 40.4; for registered nurses, the ratio was 4.6; for licensed practical nurses, 6.2; and for nursing aides, 29.6. Some regional variations were noted in staffing ratios; the widest variations were in registered nurse ratios, the least were in nursing aide ratios (see table 10-14).

Nursing care is, by definition, the principal type of service needed by residents of nursing homes and extended care facilities. The resident population includes individuals of all ages ranging from children handicapped by birth defects to the elderly who need assistance in coping with infirmities or who are totally dependent on caretakers for maintaining vital functions. The elderly, however, constitute the most rapidly growing segment of the population, requiring care over long periods of time. By the year 2000, it is estimated that 35 million people will be 65 years or age or over, an increase of 9 million over 1980 (USDC, BC, 1982). There is, however, only a limited amount of current data regarding the types and levels of nursing care needed by those who are cared for in these facilities.

According to a recent analysis of data from 37 States on residents in beds certified under Medicare as skilled nursing facilities, the Health Care Financing Administration determined that 56 percent of the residents were confused or disoriented, 48 percent were incontinent, and 30 percent required special skin care. Evidence presented to the Special Committee on Aging of the U.S. Senate supported the widely reported observation that increasing numbers of Medicare patients are being discharged from hospitals with needs that require skilled nursing care, and that 95 percent of nursing home residents require some assistance with activities of daily living.

Most of the nursing care in nursing homes and long-term care facilities is provided by personnel with lesser training than registered nurses, few of whom have had formal preparation or continuing education in gerontological/geriatric nursing. Nursing aides provide six times as much nursing care as do registered nurses and five times as much as licensed practical nurses (as shown in table 10-14). Since nurse aides are minimally prepared for their responsibilities and are unlicensed, they require more instruction and supervision than more experienced staff. The need for supervision of inexperienced personnel is compounded due to their high turnover rate. This has the effect of diluting still further the amount of professional nursing time for direct patient care.

Public/Community Health Nursing

This section deals with nurses employed by local and State boards of health, visiting nurse services, agencies providing home health care and nurses providing service in public schools and occupational settings. Numerous titles have been used to identify nurses whose practice is in the community, as opposed to institutionally based. Lack of clear operational definitions, for terms such as "community health setting," "public health nurse" and "community health nurse," has complicated the task of collecting and analyzing work force data.

The need to reach consensus on definition of these terms was one of several issues addressed in a national invitational conference convened under the auspices of the Division of Nursing in September 1984. Agreement was reached that "community health nurse" should be used as a generic term to describe an individual providing care in the home, school, or place of work. The term "public health nurse" would refer specifically, at the basic level, to individuals whose practice focuses primarily on health promotion, disease prevention, and health education, and with management, coordination, and continuity of care within the community. The distinguishing characteristic of the care they provide is the focus on health care needs of individuals and families who are most vulnerable to illness and disability. A baccalaureate degree in nursing is a prerequisite to carrying out these functions and most nurses so prepared are employed by official agencies. At the advanced level, the term "community health nursing specialist" would be used to designate an individual prepared at the master's level in any one of several clinical areas and practicing in a noninstitutional setting. The term "public health nurse specialist" would refer only to nurses with advanced preparation in public health whose practice is community-focused and population-based and utilizes the body of knowledge and skills of both public health and nursing.

Three sets of data provide information on nurses in community health settings: the November 1980 National Sample Survey of Registered Nurses (USDHHS, ODAM, 1983); the January 1979 Survey of Public Health Nurses (USDHHS, DN, 1982) and the November 1983 National Sample Survey of Licensed Practical/Vocational Nurses (USDHHS, DN, 1983). Because of the definitional problems described and differences in methods of data collection, the numbers from each of the studies vary. However, these data serve to set parameters around the number of nursing personnel employed in settings where community health activities are carried out.

The November 1980 sample survey of registered nurses, which collected data from individuals holding licenses to practice as registered nurses, estimated that almost 7 percent, or 83,000, of the 1.27 million employed registered nurses were working in community health settings (see table 10-10). An additional 2 percent, or 31,000, were estimated to be working in public schools (boards of education). The November 1983 sample survey of licensed practical nurses reported that an estimated 2.5 percent or 13,600 of the 539,500 licensed practical nurses employed in nursing were in community health settings (see table 10-11). A relatively small number of the employed licensed practical nurses, 1,700, worked in school settings.

The January 1979 Survey of Community Health Nursing, which surveyed State and Territorial Nursing Directors and some local agencies, provides another set of data on nursing employment in community health settings. In addition to providing data on registered nurses, this study contains data on the licensed practical nurse complement and on auxiliaries to nursing personnel. It should be pointed out that the data on registered nurses provide a count which is significanty lower than the one found in the 1980 sample Survey. Even though the National Sample Survey was carried out about two years after this study, it cannot be assumed that the differences between the two studies are solely due to the passage of time.

According to the January 1979 study, there were 56,993 registered nurses employed in community health settings, exclusive of boards of education, in the United States and the territories of Guam, Puerto Rico, and the Virgin Islands. Also employed were 6,513 licensed practical nurses and 35,073 staff person identified as auxiliaries to nursing. Over three-quarters of the auxiliaries were part-time workers in contrast to 32 percent of the licensed practical nurses and 19 percent of the registered nurses. On a full-time equivalent basis, there were 51,438 registered nurses, 62 percent of all full-time equivalent nursing personnel. The 5,456 full-time equivalent licensed practical nurses represented 7 percent and the 26,107 auxiliaries, 31 percent.

Substantial differences were noted in the distribution according to the types of settings in which different categories of nursing personnel were located. The majority of the registered nurses (56 percent) and 39 percent of the licensed practical nurses were employed by official State and local agencies while only 30 percent of the nursing care auxiliaries were employed in such agencies. The largest single employer of nursing auxiliaries was the organized home health agencies. Forty-four percent of these workers were employed in these agencies.

These same agencies employed another 39 percent of the licensed practical nurses but only 18 percent of the registered nurses. It should also be noted that more than half of the part-time auxiliaries and 77 percent of the part-time licensed practical nurses worked in these organized home health agencies. Therefore, on a full-time equivalent basis, these agencies had 8,521 registered nurses (28 percent of the nursing personnel), 1,723 licensed practical nurses (6 percent), and 20,310 auxiliaries (66 percent).

In addition to those employed in the types of agencies identified above as agencies in which community health services might be delivered, the practice of nursing within the occupational health area may be subsumed under the broad category of community health services. The November 1980 sample survey of registered nurses estimated that 29,162 nurses, or 2.3 percent of the 1.27 million employed nurses, were working in occupational health settings (see table 10-10). In the September 1977 sample survey,

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there were an estimated 24,317 registered nurses employed in such settings. Thus, nurses employed in occupational health areas had increased 20 percent between 1977 and 1980. The November 1983 sample survey of licensed practical nurses estimated that about 6,000 LPNs or about 1 percent of the almost 540,000 employed at that time, were working in occupational health settings (see table 10-11).

Other Ambulatory Care Settings

Given the multiplicity of settings in which nursing personnel are employed throughout the health care delivery system, the earlier discussion on employment settings covers only a portion of nursing personnel. (The other areas of employment are shown in tables 10-10 and 10-11). The November 1980 Sample Survey of Registered Nurses estimates that about 6 percent, or 72,000 of the 1.3 million registered nurses in practice at that time, were employed in physician/dentist ambulatory care settings. For licensed practical/vocational nurses, the November 1983 sample survey of those nurses estimates that about 9 percent, or 49,000 of the almost 540,000 employed at that time, were in physician/dentist ambulatory care settings. Both registered nurses and licensed practical nurses were more likely employed in offices in which more than one physician is practicing than in offices of solo practice physicians. Only about 4 out of 10 of these nurses were employed by solo practice physicians. Among those in multi-physician practices, about 3,000 registered nurses in 1980 and 3,800 licensed practical nurses in 1983 were employed in health maintenance organizations.

Student health services in private elementary and secondary schools and in colleges and universities engaged about 11,000 of the registered nurses in 1980 and about 2,200 licensed practical nurses in 1983. A final group providing ambulatory care service to the population are those who are self-employed. While still a relatively small segment of the registered nurse work force, numbering about 11,000 in 1980, the number of those nurses had about doubled in the 3-year period between 1977 and 1980.

2. Selected Areas of Practice

Nurse Practitioners

Federal support for training of nurses for expanded roles has existed since the mid-1960s. During the sixties and early seventies, a general nursing legislative authority provided Federal support for projects to define the role, document the quality of care provided, and evaluate and test the safety and efficiacy of the nurse practitioner role. The outcomes from these projects stimulated interest in the development of a discrete authority for nurse practitioner projects.

In 1975 a separate authority for nurse practitioner training was included in the Nursing Training Act of 1975. From 1975 through Fiscal Year 1984, $97.3 million have been invested by the Federal Government in nurse practitioner training.

Nurse practitioners are registered nurses who have advanced educational preparation beyond the basic requirements for licensure. They have successfully completed a formal program of study as preparation for an expanded nursing role in the delivery of primary health care in a variety of settings. Their functions include: health assessment; physical examination; development of a plan of care; management of minor acute self-limiting conditions and chronic illnesses; instruction and counseling of individuals, families and groups; health promotion and disease prevention activities; coordination of services and referral. The focus of their practice depends on their specialty area such as: children, family, the elderly, and women's health. The nurse practitioner's scope of practice is necessarily broad since they facilitate access into the health care delivery system and provide continuity within the system as the patient moves from one part of the system to another. Because they are licensed as nurses, they are accountable for their nursing practice, which includes numerous functions based upon independent nursing decisions.

In the performance of those components of their role traditionally provided by physicians, nurse practitioners function within the protocols for practice established collaboratively by the physician and nurse practitioner. Thus, nurse practitioners can independently manage a client without the client necessarily seeing the physician; however, it is always in the context of a system which provides for consultation, collaborative management or referral.

Nurses who practice as nurse practitioners or nurse midwives represent a relatively small segment of the registered nurse work force. According to the National Sample Survey of Registered Nurses, November 1980 (USDHHS, ODAM, 1983), there were an estimated 16,757 registered nurses who were in nurse practitioner and nurse midwife positions. This number represented 1.3 percent of all employed registered nurses. Seventy-eight percent of the nurse practitioners and nurse midwives in this group received formal training. About 85 percent of those with formal training had certificate preparation and 11 percent had master's education.

Programs to prepare nurse practitioners and nurse midwives have increased with Federal support for such training. Programs are characterized by variations in duration, content, type and educational philosophy and are offered at two levels of preparation, certificate and master's. The certificate programs are a minimum of 9 months of full-time study; the graduate programs 1-2 years of full-time study. Both types of programs combine the theory and practice necessary for conducting health assessment and physical examinations, diagnosis and treatment, and management and provision of services to restore health. Emphasis is placed on health maintenance, disease prevention and health education and counseling. The physical and psychosocial courses in the master's program are usually taught at an advanced level, building on the basic science courses required for the baccalaureate degree. Master's degree programs include a research component and frequently a minor in teaching or administration. The certificate programs generally award continuing education credit; a limited number award academic credit.

In an attempt to evaluate educational efforts to prepare nurse practitioners, the Division of Nursing has supported a series of studies to provide national data on nurse practitioner programs, the graduates of these programs and their employers. These studies, carried out under contract by the State University of New York at Buffalo (SUNY), have made it possible to make comparisons and document trends based on data collected over 10 years.

In 1973, the SUNY study identified over 130 programs; in 1980 this figure had increased to about 200 programs. The estimated number of graduates produced from these programs between 1970 and 1981 is approximately 20,000. As of early 1985, the number of programs is approximately the same, representing stabilization in their growth. In FY 1984 about 45 percent, or 86, of these programs received Federal support under the nurse practitioner legislative authority.

There are some major trends that can be noted from these studies. In the early years of the nurse practitioner movement (1973), 65.5 percent of the programs were short-term certificate programs. By 1984, 77.2 percent of the programs funded under the nurse practitioner training authority were at the master's level, 19.3 percent at the certificate level and 3.4 percent were RN/BSN programs. (This shift has evolved because of the growing recognition that primary care practice requires the breadth of education available primarily at the graduate level.)

The number of graduates from master's programs had also increased significantly. Fifty-nine percent of the total number of master's-prepared graduates completing programs from 1970 to 1981 graduated in the last 4 years. According to the 1980 SUNY study, 43.7 percent of the estimated number of nurse practitioner graduates completing the program from 1978 through 1981 would be prepared at the master's level and 56.2 percent at the certificate level.

The primary care specialty areas for which nurse practitioners are prepared have reflected a sensitivity to perceived health care needs and the employment market. The pediatric nurse practitioner programs established in the early years focused mostly on well child care. Today, some of the master's PNP programs have expanded their focus to include content and clinical experiences to prepare their graduates to work with children who are chronically ill, physically handicapped or learning disabled. These children were identified as one of the most underserved groups in need of primary health care. Increased efforts in providing primary care for these children was recommended in the Surgeon General's report, Health People (USDHEW, OASH). Another area of potential growth for PNPs and school nurse practitioners is school health. The recent report on the four-State demonstration project supported by the Robert Wood Johnson Foundation showed that school nurse practitioners can diagnose and treat many health problems, can increase access to health care and can improve the health of school children (Robert Wood Johnson, 1985).

Over the years, the SUNY studies have shown that there has been a significant increase in the percent of family and adult programs preparing nurse practitioners. The broad category of adult programs includes the gerontological programs which focus primarily on the elderly. Fiscal Year 1984 funding of nurse practitioner programs also reflects this trend. Approximately 60 percent of the projects funded were for these specialty areas. Twenty-five percent of these programs focused specifically on the elderly. Unfortunately, the actual growth in the number of programs preparing gerontological nurse practitioners has not changed significantly over the past few years, despite the Federal Government's and private sector's emphasis in this area. The limited job market for the graduates and the barriers to reimbursement for nurse practitioner services affect not only the growth in the number of programs but also the enrollments.

Data gathered from the latest SUNY study indicated that the proportion of graduates engaged entirely in nurse practitioner practice (65.4 percent) has decreased slightly from 1973 (69.1 percent) with a corresponding increase in the proportion who reverted to practice in traditional roles (19.5 percent). This, according to some studies (Lazarus, et al.), could be a reflection of some of the constraints to the nurse practitioner movement that come from physicians, from restrictive State licensing and from unfavorable reimbursement practices. As barriers continue to increase in some areas of the country, job opportunties for nurse practitioners decrease. Other graduates (2 percent) practice as nurse practitioners and teach in nurse practitioner training programs or provide consultation to other nursing staff.

Changes have also occurred in the practice setting locations in which nurse practitioners work. The portion employed in rural areas (2,500 or fewer population) has substantially decreased from 21.6 percent in 1977 to 9.4 percent in 1980, while the proportion working in inner cities has increased from 22.6 percent to 47.3 percent. Over one-third of nurse practitioners practice in communities of fewer than 25,000 population, including rural areas. Certificate-prepared nurse practitioners were more likely to practice in rural areas and towns (2,501 to 5,000). Master's-prepared nurse practitioners were more likely to practice in large cities (over 100,000), specifically inner-city areas.

Regardless of the area of practice, whether inner city or rural, over half of nurse practitioners' patients had annual incomes of under $10,000. Higher income ($20,000 and over) patients represent a relatively small segment of the NP patient population (less than 14 percent) but there is a significant increase in this direction. Nurse practitioners are still moving into new health care delivery sites. In 1980, 45.6 percent of the certificate graduates and 36.1 percent of the master's graduates were the first NPs in the setting.

Approximately 87 percent of the graduates responding in the SUNY studies reported they were employed as nurse practitioners: more than 64 percent in ambulatory practices such as community clinics, HMOs, physician offices; 14 percent in public offices, schools systems, and schools for the mentally and physically handicapped; 8 percent in health departments or home health agencies; and almost 3 percent in extended care facilities. The number of nurse practitioners working in extended care facilities almost doubled. As noted in the IOM study, there is a continuing need for the services of nurse practitioners in these settings.

For the nurse practitioners surveyed in the SUNY studies, salary was the major, if not the only, source of income. Their average range gross annual income was from $20,251 to $21,278. In all instances, the graduates' anticipated increase in salary as a result of their education, was less than the actual increase received when employed as an NP. The 1980 National Sample Survey found that salaries of RNs with master's degrees averaged $22,000 (Bentley, et al., 1982).

As the expansion of the nurse's role evolved, so did the credentialing process for nurse practitioners. State licensure as a registered nurse, granted by the individual States on the basis of passing a uniform examination, is the minimum legal requirement for all professional nurses, and is the basic legal requirement for practice as a nurse practitioner. According to a survey by C. LaBar (1983), about 43 States have statutory or regulatory references to advanced nursing practice in their nurse practice acts or the rules which allow nurses to function in the expanded role. Almost all States recognize the role of the nurse practitioner. In addition to their license, some nurse practitioners have obtained "certification". Certification provides tangible recognition of professional achievement and clinical expertise in a particular field of nursing practice. Several professional associations or boards "certify" nurse practitioners.

There have been numerous studies to document the impact and effectiveness of nurse practitioners. The report of the Graduate Medical Education National Advisory Committee concluded that "... nurse practitioners and nurse midwives can make positive contributions to the health care system, can enhance patient access to services, decrease cost and provide a broadened range of services. Certain consumers prefer the non-physician provider" (USDHHS, HRA, 1980). The study titled "The Survey and Evaluation of the Physician Extender Reimbursement Experiment," conducted by System Science Incorporated, showed that physician practices which included nurse practitioners provided more visits per $1,000 of practice cost than solo physician practices and at a higher level of quality care (USDHEW, HCFA, 1977).

In another study, Salkever et al. (1982) concluded that care by nurse practitioners for many ailments is less costly than care by physicians but just as effective. This study used a new way of assessing the cost effectiveness of health practitioners based on time spent by providers, overhead charges for space, and costs of ancillary services and drugs. Ramsey et al. (1982) showed that nurse practitioners not only provide primary care equivalent to that of physicians, but also offered something special that increases adherence. Runyan's (1975) studies of nurses in extended roles, caring for chronically ill patients, have shown outcomes of care that often elude physicians. The National School Health Service

Project showed that when school nurse practitioners were placed in school settings to provide health care that "... medically underserved children had access to care ... a significant amount of illness was found," and that "almost all the health problems found (96 percent) were followed up and resolved or still under treatment" (Robert Wood Johnson, 1985).

After reviewing numerous studies about nurse practitioners' and physician assistants' performance, the Congressional Budget Office concluded that they provide high quality primary medical services, improve access to care, and are potentially cost effective (The Congress, CBO, 1979). An Office of Technology Assessment report confirms these findings but states, "while experiences show that nurse practitioners and other physician extenders can lower average expenses per visit by as much as over one-third, the manner in which the physician or institution uses them and the way in which time freed through task delegation is used, will determine whether potential saving is realized" (LeRoy and Solkowitz, 1981).

Clinical Specialists and Nurse Clinicians

In responding to the 1980 National Sample Survey request to indicate the nature of their nursing position from a list of 26 position titles, an estimated 19,070 nurses had the position title of clinical nursing specialist and an estimated 8,005 had the title of nurse clinician. The estimated number of clinical specialists has almost doubled since the 1977 sample survey; however, the number still represents less than 2 percent of employed registered nurses. Among the estimated number of nurses with position titles of clinical nursing specialist, 27 percent had at least a master's degree, and of the nurse clinicians, 15 percent had at least a master's degree. Although advanced educational preparation in nursing is recommended by the nursing profession for practice in specialized areas, these percentages suggest the majority of nurses now functioning in these roles developed their expertise on the job, through programs of continuing education, or through independent study. Nurse clinicians and clinical nursing specialists, as the titles imply, are expected to be experts in clinical practice related to a field of nursing science. The Institute of Medicine report and the National Commission on Nursing study recommend that clinical specialists, in addition to their basic preparation, have formal education, generally at the master's level.

Clinical nursing specialists practice in a variety of settings, and hold a variety of position titles, many of which have no commonly agreed upon role definition. For example, nurses with master's-level, advanced clinical education (in certain areas of nursing) may be called primary care specialists by position title when they practice in an expanded role; or they may be called clinical managers when they hold positions that combine advanced clinical practice with management of a service unit. Attention has recently been directed toward the potential of advanced clinical education for meeting the particular health problems of geriatric and nursing home patients, as well as for providing primary care in homes, ambulatory facilities, long-term care facilities, and other health care institutions (IOM, 1983).

In creating clinical specialist programs to develop various new kinds of nurse specialists, the nursing profession responded both to market signals that indicated a demand for new services from nurses, and to factors external to the profession that signaled the need for change in advanced practice methods or foci. It is typical, however, that the educational and experiential qualifications and job content in the market place are not always well defined when educational programs are being designed to meet an innovative challenge in the health care arena. A current example is the growing role of nurse specialist in home care. This role blends aspects of community health, acute care and nursing administration. It is a unique area of nursing practice that is now developing and appears to be different from the three areas from which it is emerging.

The primary characteristics of nursing practice at an advanced level are professional authority, accountability, responsibility, and collegiality with others (Diers, 1985). Clinical nurse specialists interweave the art and science of nursing at an advanced level by using their expertise in patient care to increase excellence in the delivery of nursing care to a specialized group of patients (Holt, 1984). A person practicing in such a manner has specialized at the master's level in a selected clinical nursing area and prepared for a functional role in advanced clinical practice, management or teaching.

Some clinical specialists practice through using their functional role preparation as teachers in staff development and in direct teaching positions. Clinical specialists in such teaching positions can work collaboratively with staff nurses to improve the quality of patient care and patient outcomes as well as to advance the state of nursing practice (Sparacino, 1983). More often, when this collaborative arrangement does not occur there is little change in nursing practice. But it has been demonstrated in several studies that when a clinical nurse specialist (a) is perceived as a clinical expert, (b) has a leadership position and (c) either a designated or acquired authority base which is visible, familiar and acceptable to nursing staff and the specialist alike, then the specialist can positively affect nursing practice and patient care outcomes (Little and Carnevali, 1967; Georgopoulos and Jackson, 1970; Georgopoulos and Sana, 1971; Ayers, et al., 1971; Murphy, 1971; Pozen, et al., 1977; Girouard, 1978; Linde and Janz, 1979). The major difficulty described by Stevens (1976) is that the clinical specialist role was not conceived or designed to fit into the typical bureaucratic, hierarchical management system of health care institutions. Further, she describes the original, loosely defined role as an administrative anomaly, grafted to a system in which it does not comfortably fit.

The issue of her/his authority in a practice setting is one of the many challenges or problems a nurse specialist encounters. Health agency and hospital organizational patterns above the first-level care unit are based on functional roles, rather than clinical relationships. It is not so much an issue of being in a line or staff relationship, as it is having a position of functional authority (Ehrenreich and Steward, 1979). Additional ingredients for facilitating the specialist's role are: clearly defined position descriptions, use of a title consistent with the functions

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expected, and organizational sanction of the nurse specialist's authority to make change where and when appropriate (Baker and Kramer, 1970; Colerick, Mason and Proulx, 1980).

In the study to identify magnet hospitals that consistently attract and retain professional nurses in practice, the directors of nursing who were interviewed identified several factors that facilitate their hospitals' success. Among these were the availability of clinical nursing specialists as patient care and staff resources, clinical advancement (career ladder) programs, and joint practice committees. Many of the magnet hospitals employ master's-prepared clinical specialists, who are described as adding a dimension of nursing care that would otherwise not be available to patients and their families (American Academy of Nursing, 1983). The IOM report on nursing and nursing education notes that the demand for specialists has not abated, that the rate of increase in technological complexity of care has not declined and that greater collaboration and shared responsibility among the various segments of nursing is recommended (IOM, 1983).

Some clinical specialists practice in a managerial role, and some information indicates that the use of clinical specialists in this role is increasing, particularly at the middle management level. Clinical and management responsibilities for a nurse in a clinical management role, such as a clinical unit coordinator or head nurse, are not discrete and separate activities. The essence of this type of role is integration of clinical and organizational management expertise and responsibilities so that optimal patient care becomes the focus of the organization and so that nursing resources are managed in a manner that facilitates quality patient care (Williams and Cancian, 1985). Nurses in positions blending clinical specialist and management roles have been found effective when administrative and professional authority are combined because the power of each is enhanced (Wallace and Carey, 1983). The placement of clinical nurse experts who have knowledge of the nursing management role in middle management positions retains clinical expertise in the institutional setting when budgetary cutbacks are necessary.

Nurse Administrators

A nurse administrator exercises authority and responsibility for allocation of resources, introduces changes that reflect current practice, develops and implements findings from clinical and organizational research, and exercises appropriate judgment in the management of human resources. The major perspective is on policy, long range planning and fiscal affairs. The environment in which nurse administrators work today is one of uncertainty, hallmarked by change in which many forces are operating. Administrators are urged to examine effectiveness and efficiency of personnel, wastage of both supplies and personnel, and the relation of departmental structure to function, while maintaining high quality services to patients, institutional solvency and ability to meet competition have become of paramount importance (Aydelotte, 1983; Beyers, 1984). In the new competitive arena of the health care industry, the challenge to the nurse administrator is to maintain both quality care and a sound financial base for the nursing department. The power of the nurse executive to shape the practice of nursing is the crux of change in nursing services. Accepting that power, understanding its nature and using it to achieve desired outcomes are recognized as essential for nurse executives in the current climate of change that pervades the health care system (Beyers, 1984).

A study of a sample of the membership of the American Society for Nursing Service Administrators (now known as American Organization of Nurse Executives) conducted in 1982 indicates that the role of the nurse executive has been broadened to increase involvement in general hospital affairs (Aydelotte, 1983). The senior nursing administrator in a hospital reports to the highest administrative officer, has major responsibility for preparation of the nursing budget and its management, participates in planning the overall hospital budget and in setting its priorities, and attends hospital governing board meetings and medical executive committee meetings. On average, this nurse administrator has taken course work in administration, engages in community and professional affairs and has recently accrued continuing education hours. Tenure in current position was from one to five years and responsibility for areas other than nursing, such as those closely related or having a high component of nurses on staff, was not uncommon. Additionally, the report indicates that certain trends were beginning to become evident, such as the movement toward requiring higher credentials for nursing service administrators, the appointment of nursing service administrators to hospital governing boards, the use of titles that reflect administrative and corporate responsibilities, the adaption of primary nursing as a methodology of choice for delivering care, the assumption of responsibility for out-of-hospital units or departments, the institution of bylaws for the nursing department, and the use of faculty titles to indicate educational responsibilities.

The economic and organizational changes in the health care system are leading to more streamlined organizational structures, more accountability and more responsibility for the senior nurse executive and for nurses in middle management roles. Continued competence in clinical nursing skills is becoming less emphasized for senior management positions than are leadership ability, knowledge of financial management, organizational functioning, long range planning and knowledge of the general health care system. Not infrequently, the senior nurse executive in a setting has responsibility for departments other than nursing which relate to caring functions. These nurse executives usually hold academic degrees at the graduate level and usually have had administrative content in their programs (Aydelotte, 1983).

Middle management positions in a nursing department may be at the department head level for which there are various titles, such as supervisor in a community or home health setting; clinical director, clinicial coordinator, head nurse or clinical manager in an acute care setting. Appointment to these types of positions frequently requires competence in a clincal nursing specialty at an advanced level and competence in the management of a nursing service unit. The nurse with these competencies would hold a master's degree with a major focus in a clinical speciality with role preparation in administration or a major in nursing administration with a minor in a clinical specialty. Specific education provides only part of the requirements for a nurse to function successfully in a management role. It is to the health care organization's benefit to train and prepare nurses in their employment who are entering management. As a nurse moves from clinical to management specialty practice and up the management ladder within an organization, there is increasingly less emphasis on technical skills and more on human resource management skills and conceptual ability. The nurse manager must be able to see the overall goals of the health care organization, appoint people who are best able to realize these goals and give them the incentive, guidance and support needed to fulfill the goals (Gleeson, Nestor and Riddell, 1983).

Nursing directors and middle managers have been identified as pivotal to the success of the nursing department, to the development of professional nursing practice within an agency, to the enhancement of collegial relationships through decentralized authority and to retention of nurses through policies and practices that provide a caring climate for staff as well as for their patients. (American Academy of Nursing, 1983; National Commission on Nursing, 1983; USDHHS, 1982.) With changes in reimbursement there are fewer hospitalized patients but those that are hospitalized require increasing intensity of care and services and are discharged sooner to be cared for in the home and community.

These changes have resulted in an expansion of the number of kinds of coordination activities for the nurse to carry out. It has been documented that the nurse has the knowledge and responsibility required of the integrator of patient services, but infrequently also has the appropriate authority to carry out this aspect of the nursing role in the eyes of representatives of other departments. To improve this situation and return the central focus of the nurse to the caregiver role, the top administrator of nursing should be in a position in the organizational structure to facilitate gaining a high degree of responsiveness of the respective department heads to patient needs (McClure and Nelson, 1982; National Commission on Nursing, 1983). There is indication that increasing numbers of nursing administrators are achieving authority commensurate with their responsibilities and are decentralizing their control within the nursing organization to middle level managers acting as department heads and to staff nurses for clinical decisionmaking (Lancaster, 1985; Beyers, 1984; Fuszard, 1983; Poulin, 1982; Fourcher and Howard,1981).

Nurse Educators

Registered nurses engaged in the teaching of students in schools of nursing are an important segment of the nurse supply. Although a relatively small group, about 4 percent of the total registered nurse supply, they are key to the assurance of a sufficient and appropriately qualified source of practitioners of nursing. As pointed out earlier in this report, the availability of those qualified and appropriately prepared to undertake the teaching role has long been a concern of the profession as well as of policymakers at all levels.

Preliminary data from a January 1984 National League for Nursing study of faculty and administrators in nursing educational programs provided a count of 26,771 faculty members in nursing educational programs for registered nurses. Forty-seven percent of these were teaching in baccalaureate and/or higher degree programs; 35 percent in associate degree programs, and 18 percent in diploma programs. In addition to the number employed, the nursing education programs reported a total of 694 budgeted vacant positions for a vacancy rate of 2.9 percent. The vacancy rate was highest in the baccalaureate and higher degree programs. About 3.5 percent of the budgeted full-time equivalent positions in these programs were vacant compared to 2.3 percent in associate degree programs and 2.2 percent in diploma programs.

For all types of programs except diploma programs, the vacancy rates were lower in 1984 than in 1982 and 1980; the rates in baccalaureate and higher degree programs were consistently higher in all three years than were the rates for the other types of programs. To some extent this may be a reflection of the availability of appropriately qualified nurses for these faculty positions. The November 1980 National Sample Survey of Registered Nurses estimated that 33 percent of nurses with master's degrees and 66 percent of nurses with doctoral degrees held positions in nursing education. Faculty employed in baccalaureate and higher degree programs are more likely to have advanced preparation than faculty in other types of programs. The January 1984 National League for Nursing study showed that 17 percent of the baccalaureate and higher degree program faculty, or 2,137, had doctoral degrees. In total, 91 percent of the faculty with doctoral preparation in education programs were employed in baccalaureate or higher degree programs. The remaining faculty in the baccalaureate and higher degree programs mostly had master's degree preparation. The master's degree is considered the minimum acceptable level of preparation for teaching in institutions of higher education. About 32 percent of the associate degree program faculty and 47 percent of the diploma program faculty had less than master's degree preparation.

Data from the January 1984 study describing the administrators in nursing educational programs and the faculty in the practical nursing programs were not available at the time of this writing. January 1982 data on administrators of nursing educational programs, both registered nurse and practical nurse programs, reported 2,339 administrators. Of these, 20 percent had doctorates and 59 percent had master's degrees. Administrators in baccalaureate and higher degree programs were more likely to have doctorates than those in other programs; 71 percent had doctorates while 16 percent of those in associate degree programs had doctorates. Four percent of the diploma program administrators and 3 percent of the practical nursing program administrators were doctorally prepared. About 47 percent of the practical nursing program administrators had less than master's degree preparation.

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The January 1982 study also reported that a large majority of the faculty in practical nursing programs were also prepared at less than baccalaureate level. Of the 5,464 reported nurse faculty in practical nursing programs, 81 percent had no more than a baccalaurate degree. Fifty-two percent of all the faculty had baccalaureate degrees while 22.5 percent were diploma-prepared and 6.7 percent had associate degree preparation (NLN, 1983-84).

Nurse Researchers

Although a relative newcomer to the research arena, nursing research is well established as a distinct area of scientific inquiry. In its 1977 report, the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel of the National Academy of Sciences, published the following definition of "nursing research:"

> Nursing research focuses on the role of nursing care in the prevention of illness, care of the sick, and the promotion and restoration of health. Although it relies upon and utilizes the substantive scientific information and methodology provided by the other biological and behavioral sciences, it differs from those other scientific areas in that it focuses on their relevance to nursing rather than other aspects of health care.
>
> By tradition, natural inclination, and previous training, nurses have a special interest in and potential competence for research in this area and it is natural that they should wish to play a part in its advancement. Nurses view health problems differently and direct the results of their research to quite different audiences than other biomedical and behavioral scientists. Hence, nursing research is usually done by nurses. The Committee therefore concurs that nursing research is properly regarded today as a distinct area of scientific inquiry (Committee, 1977, p.152).

The Commission on Nursing Research of the American Nurses' Association, the foremost professional policy-making body for nursing research in the United States (now called the Cabinet on Nursing Research) published the following definition of "nursing research" in 1980:

> Nursing research develops knowledge about health and the promotion of health over the full life span, care of persons with health problems and disabilities, and modalities to improve the quality of life for individuals regardless of health state, but particularly for groups such as the frail elderly, the chronically ill, and the terminally ill. These foci complement biomedical research, which is primarily concerned with causes and treatments of disease (Commission on Nursing Research, 1980, p. 219).

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The Bureau of Health Professions serves as the Federal focal point for support of nursing research and for the training of nurse investigators. Both the extramural nursing research program and the fellowship program for predoctoral and postdoctoral study by nurses were established in 1955 as a joint responsibility of the Division of Nursing Resources (DNR) and the National Institutes of Health (NIH).[4] Since that time, the Federal Government has been the single most important source of support for research and research training. Early research focused primarily on studying ways to improve procedures and on educational and administrative issues. By the mid-1970s there was a discernible shift toward systematic inquiry designed to evaluate the extent to which practice strategies are effective in improving care and in extending the scientific base of nursing practice.

Research productivity has increased as the cadre of nurse researchers has grown; research itself has become more firmly anchored in a theoretical framework, and research methodologies have become more sound and sophisticated. These changes have been fostered through the program of research support administered by the Division of Nursing. In addition to supporting discrete projects submitted by individual investigators, awards have been made to schools of nursing offering doctoral programs to stimulate nursing research in areas that emphasize special health needs of the Nation and to advance research efforts and resources of faculty. Program grants have been a mechanism for supporting clusters of studies around a single theme. In order to help new investigators establish themselves as bona fide researchers, new investigator nursing research awards have been made to support small studies of high quality. Long recognized as a need, closing the gap between research and practice by translating research outcomes into clinical knowledge for use in practice settings is now a nursing research program priority. This emphasis is aimed not only at utilization of research findings but also at creating a climate of inquiry to nourish research interest of students and practicing nurses.

Despite these efforts, the IOM study (IOM, 1983) concluded that lack of a stable base of adequate funding for research and the scarcity of nurse researchers have inhibited the development of nursing investigation. The 1980 National Sample Survey of Registered Nurses estimated that approximately 3,000 nurses, 0.2 percent of the 1.27 million employed registered nurses, held doctoral degrees, the generally accepted credential for research capability. Nine out of 10 so prepared are employed, most on a full-time basis, in teaching or administrative positions. Less than 5 percent reported research as their major function. In order to expand the cadre of nurse researchers and provide impetus for the initiation, coordination, monitoring and dissemination of clinical and operational nursing research, the IOM study recommended establishment of an entity or center at a level in the Federal Government that would have organizational visibility and scientific prestige.

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[4] The Division of Nursing Resources and the Division of Public Health Nursing were consolidated in 1960 to form the Division of Nursing, and the research grants program was established as a branch of the Division.

During 1984, congressional interest in creating a more prominent organizational identity for nursing research was strongly endorsed by the nursing community which worked for passage of a House bill to establish an Institute for Nursing at the National Institutes of Health or, as an alternative, for a Center for Nursing Research in a Bureau of Nursing as proposed in a Senate Bill. The House bill, ultimately passed by the Congress, was pocket-vetoed in October 1984. Subsequently, several activities were undertaken by the Assistant Secretary for Health and the Director, NIH, to determine what efforts could be undertaken administratively to strengthen nursing research within the Public Health Service. Acting on one of the recommended actions, the Secretary announced the establishment of a Center for Nursing Research in the Division of Nursing on January 14, 1985.

The Center's objectives were to facilitate: (1) building of the body of scientific knowledge that underlies nursing practice, nursing services administration, and nursing education; (2) strengthening these areas through the utilization of such knowledge; (3) career development of nurse-scientists; and (4) developing research resources in settings where nursing research is carried out.

3. Rates of Compensation

The respective sample surveys are the sources of information on the distribution of earnings of registered and licensed practical nurses according to location of practice. For registered nurses, until the data from the November 1984 survey becomes available, the latest information is for November 1980. For licensed practical nurses, the data are for November 1983.

Registered nurses working on a full-time basis averaged $17,398 a year in November 1980 (see table 10-15). Some variation was noted in salary level according to type of work setting and the position level. The lowest average salaries in the 1980 study were for full-time nurses employed in physicians' offices, $12,048, and for staff nurses in nursing homes, $13,921. Salaries for hospital staff nurses averaged $16,521. Within the hospital area itself, salaries of nurses in top administrative positions averaged $24,486, only 48 percent above the average salary of staff nurses. Salaries of clinical nursing specialists and nurse clinicians averaged only about 19 percent more than staff nurses.

Salaries of licensed practical nurses working on a full-time basis in November 1983 averaged $14,395 a year (see table 10-16). As was true for the registered nurses, their average earnings varied according to their work setting. Those working in student health service settings on a full-time basis averaged the least, $11,053. Those in hospital settings had a higher average salary than licensed practical nurses as a whole. The average salary for practical nurses employed in hospitals was $15,106. Similar to the findings for registered nurses, those in nursing homes and physicians' offices averaged less than licensed practical nurses as a whole, $13,463 and $13,068, respectively.

Average earnings also vary according to the geographic location of nurses. For both registered nurses and licensed practical nurses, the highest average earnings for full-time employment were found in the Pacific region. For registered nurses, the average earnings in the Pacific region were about 14.3 percent higher than in the country as a whole; for licensed practical nurses, they were 14.8 percent higher. For both groups, the lowest average earnings were found in the East South Central region. Here, however, registered nurses' average earnings were closer to those of the country as a whole than were those of licensed practical nurses. Registered nurses averaged 5.8 percent less in the East South Central area than in the country as a whole while the licensed practical nurses averaged 9.8 percent less. In general, salary levels ranked about the same in all regional areas when compared to the national average salary for each occupational group except in the Middle Atlantic and the West North Central region.

In the Middle Atlantic region, the average earnings for full-time registered nurses in their principal position was lower than the average for all nurses, ranking fourth from the bottom among the nine regions. For licensed practical nurses, the average in the Middle Atlantic region was higher than the national average, ranking seventh from the bottom among the nine regions. Both registered nurses and licensed practical nurses in the West North Central region averaged less than the nurses in the country as a whole. However, the average salary for registered nurses ranked fifth from the bottom while the average salary for licensed practical nurses was second from the bottom.

D. A LOOK TO THE FUTURE FOR NURSING PERSONNEL

1. Future Supply of Nurses

In order to meet the requirements of P.L. 94-63, staff in the Bureau of Health Professions developed a model from which the projection of the supply on a national and State basis can be made. The model was built around the dynamics of the flow of nurses in and out of licensure and the work force. For registered nurses, the model also takes account of the varying educational levels which these nurses achieve and the progression from one level to another.

Since there are several dimensions to the study of the nurse supply, the model develops data on the population of nurses--all those with State licenses to practice as of the date in question; the supply itself--all those employed or available for employment if sufficient positions are not available at the time being considered; and the full-time equivalent supply which expresses employment independently of full- or part-time status. To the maximum extent possible, the model integrates and draws upon a number of discrete surveys describing various phenomena impacting on the nurse supply, most of which have been used in this report's earlier discussion on the supply of nurses. Central to the data base for the model, however, are the sample surveys of nurses. A methodological description of the modeling approach being used can be found in the Third Report to the Congress (USDHHS, DN, 1982) and in the Source Book: Nursing Personnel (USDHHS, BHPr, 1981).

Licensed Practical/Vocational Nurses

The availability of data from the November 1983 National Sample Survey of Licensed Practical/Vocational Nurses provided a base to develop a new series of projections of licensed practical nurses which would take account of current characteristics of and trends in the supply of these nurses. A number of assumptions are required for these projections. Most important among these are assumptions about what graduations might be in the future and about what proportion of the nurse population might be employed or available for employment (activity rates). Earlier in this chapter, the trends noted over the years in graduations from practical nursing educational programs were presented. In making projections of graduations for the future, it was assumed that there would be no fundamental change in the way individuals are prepared to become practical nurses. However, recognition was given to the changing employment situation discussed earlier through an assumption that the number of practical nursing programs and students would decline, showing as much as a 15- to 20-percent decrease, because higher proportions of potential students for these programs would choose to attend associate degree programs preparing for registered nurse licensure rather than practical nursing programs. These overall assumptions along with the past statistical trends in practical nursing education led to a projection of 39,200 practical nursing graduates by 1989-90 and 35,000 graduates by 1999-2000 (see table 10-17).

The proportion of the licensed practical nurse population that might be available for employment in the future was based on the data from the November 1983 survey. The basic assumption was made that licensed nurses would be inclined toward employment as practical nurses in the same proportion as the 1983 population, given the age distribution of the population at the date for which the projection would be made.

Based on these assumptions, along with giving consideration to such other areas as the proportions that might no longer be licensed or may reactivate an expired license, mortality, the proportion of graduates that seek and attain licensure, and interstate movement, it was projected that there would be a national supply of 693,500 licensed practical nurses by December 31, 1990, see table 10-18. A total of 859,000 was projected for December 31, 2000. Thus, it was projected that the number of licensed practical nurses that would be available to practice would increase by about 29 percent between 1983 and 1990. By the year 2000, the number available to practice would be 59 percent greater than the 539,500 employed in 1983.

The general direction of some of the changes in supply are of interest (see table 10-19), although actual projections on a State-by-State basis should be viewed with some caution. The data base used to develop the data for each State is a sample subject to variances. These variances could be sizeable in the smallest States because of the relatively small samples. All but five States and the District of Columbia are expected to increase their supply during the projection period. Among those States showing a decrease was New York, which in 1983 was estimated to have a total of 38,300 employed LPNs. The number available for employment was anticipated

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to be 37,200 by 1990 and 34,900 by 2000. The Middle Atlantic region, in which the State of New York is located, along with the East North Central region of the country showed the smallest overall proportionate increases over the projection period. The largest proportionate overall increases were noted for the South Atlantic and Mountain regions.

It was projected that the age level of the licensed practical nurse population would increase over the period. By the end of 1990, it is expected that the relative proportion of those who were at least 40 years old would increase to about 50 percent from the estimated 46 percent in 1983. By the year 2000, the proportion of those in the population who were 40 years of age or over is anticipated to increase to 59 percent. The median age of the licensed practical nurse population at the end of 2000 is expected to be about 43 or 44 in comparison to a median age of about 39 in November 1983. Because of the concentration of the population in the mid years throughout the period however, the ages at which these nurses had the greatest propensity to work, it is not expected that there would be any decrease in the activity rate, which remained at about 69 percent through the year 2000.

Registered Nurses

Many of the assumptions upon which the projections of registered nurses available for employment through the year 2000 are based were derived from trends noted in the 1977 and 1980 national sample surveys of registered nurses. As was true for the licensed practical nurse projections, the assumptions about graduations from nursing educational programs, both for entry-level and post-RN graduates, and the assumption about the proportion of the population that might be available for employment, are the major factors in the projections.

In looking toward the future, past historical trends in numbers of educational programs and students as well as some general assumptions about the direction that admissions to nursing educational programs might take, formed the basis for projections of the number of graduates to the year 2000. Working under a general assumption that there would not be any fundamental changes in the educational system preparing for registered nurse licensure, projections were based on statistical trends developed under the following assumptions about each of the program types.

For diploma programs, it was assumed that the rate of decline in the number of programs would increase, particularly if the reimbursement of educational costs under Medicare is eliminated. It is expected, however, that there will be some remaining diploma programs at the end of the projection period. For associate degree programs, in line with past statistical trends, it was assumed that the number of these programs would continue to increase but at a declining rate until the year 2000. At the same time, it was assumed that the average number of admissions to these programs would increase somewhat given, among other influences, the increased attraction of these programs to students from the practical nurse arena. Associate degree students were assumed to come from the female population, ages 17-44 years old; the predominant group attending these programs in the past.

For baccalaureate programs, it was assumed that the trends evidenced in the last few years for new, basic student entrants into these programs would continue. Baccalaureate students are primarily from the female high school graduate segment of the population. The proportion that the generic admission to baccalaureate programs is of the new female high school graduates has been declining. Furthermore, in looking at the trends in graduations from baccalaureate programs, consideration should be given as well to those students in baccalaureate programs who are already registered nurses, having taken their basic education in an associate degree or diploma program, and are subsequently seeking a baccalaureate degree. These students are an increasingly higher proportion of the students in baccalaureate programs. As of October 15, 1983, there were 21,192 such students in addition to the 98,941 generic baccalaureate students.

While the number of graduations of generic baccalaureate students decreased in each of the 4 years from 1980-81 to 1982-83, the number of post-RN baccalaureate graduates from these programs continued to increase. In 1982-83, there were 5,654 such graduates in addition to the 23,855 basic student graduates, 19 percent of the total graduates from those programs. Therefore, it was assumed that the trends in the number of post-RN students attending baccalaureate programs will continue and that these students will continue to take an increasing proportion of the total spaces available for baccalaureate students.

These assumptions coupled with projections of decreases in the size of the population groups from which the nursing students are drawn led to an overall decline in the number of graduates from programs preparing them to become registered nurses. As shown in table 10-20, it was projected that for 1989-90 there would be 75,300 graduates and for 1999-2000, 66,400 graduates. As can be expected, the sharpest decline in graduates occurred in the diploma programs. By the end of the projection period, academic year 1999-2000, there were 6,000 diploma graduates. Generic baccalaureate graduates decreased to 19,800 in 1989-90 and to 16,000 in 1999-2000. Associate degree graduates, however, show little change over the projection period and actually were increased over current levels. Therefore, the projected 46,100 associate degree graduates for 1989-90 represented 61 percent of the total graduates. For 1999-2000, about two-thirds of the projected total graduates were from associate degree programs.

The projection of the number of registered nurse graduates from master's degree programs was based on the statistical trends described earlier in this chapter. Thus, the increases in the form of the linear trend noted over the past few years in the total number of students were assumed to continue in the future. At the same time it was anticipated that the proportion of those who would be part-time students would also continue to grow: to 75 percent by the year 2000. A final assumption that the rate of graduations to part-time enrollments will increase over the years led to an estimate of 11,800 graduates from master's degree programs for academic year 1999-2000.

The assumption about the activity rates to be used was similar to that for the practical nurse supply. That is, nurses who had licenses to practice as registered nurses would be inclined toward employment in the same proportion as that for the population of 1980, the latest such data available, given the age and highest educational distribution of the population at the date for which the projection would be made.

Based on these assumptions, it is anticipated that the supply of registered nurses employed or available for employment by the end of 1990 would be 1,739,000 and by 2000, 2,079,000. Thus, it is expected that the number of registered nurses in the supply would increase by 63 percent over the estimated number of nurses in the November 1980 sample survey (see table 10-21).

The largest increase is anticipated for those with at least a master's degree. By 2000 it is anticipated there would be 186,000 such nurses in the supply, more than twice the estimated 67,000 in 1980. However, because it is currently anticipated that a greater proportion of master's degree students will attend school on a part-time basis than previously expected within prior assumptions, the projection of the number of nurses with at least master's degree preparation in the year 2000 is lower than the previous projection for this group.[5] This point, coupled with about a 5-percent increase in the projected overall supply over the previous projection, leads to an estimate of about 9 percent of the total supply in 2000 having graduate degrees compared to an earlier estimate of about 11 percent.

It is projected that the number of nurses with baccalaureate degrees in 2000 would be about double the number in November 1980. The 589,700 baccalaureate-prepared nurses would be 28 percent of the total supply in 2000. Those whose highest level of preparation is an associate degree or diploma would increase about 43.5 percent over the November 1980 level to a total of 1,303,500.

The same cautions indicated for the licensed practical nurse State-by-State projections should be kept in mind when viewing the registered nurse projections. However, these data provide some interesting insight into the direction of the anticipated changes in supply. Unlike the case of licensed practical nurses, all but one of the States are anticipated to increase their registered nurse supply by 1990 (see table 10-22). New York shows little increase in the number of employed registered nurses in 1990 over 1980, and by 2000, the supply of registered nurses actually decreases. Similar to the conclusion drawn for licensed practical nurses, the Middle Atlantic region shows the least increase during the projection period. Highest increases were found in the southern and western parts of the country.

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[5] Prior projections refer to series IA, Part C: Nursing Personnel in Report to the President and the Congress on the Statistics of Health Personnel in the United States. These projections are used for comparison purposes because the underlying assumptions upon which they are based are similar to those for current projections.

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As was true for licensed practical nurses, the age level of registered nurses is also expected to increase over the projection period. While the median age of the registered nurse population was about 38 in November 1980, it is anticipated that it would increase to about 45 by the year 2000. Over one-third of the registered nurse population in 2000 is expected to be 50 years old or over compared to about one-quarter in 1980.

The age level for each of the highest educational level groups within the nurse population also increases over the projection period to about a median age of 47 for those whose highest educational preparation is an associate degree or diploma, 42 for those with baccalaureates, and 48 for those with master's or doctorates. Although baccalaureate-prepared nurses were anticipated to be younger on the average than the other two groups, the median age for those nurses showed the greatest increase within the projection period. This was due to the assumption that increasingly larger proportions of the new baccalaureate graduates would come from the group that entered nursing practice through the associate degree or diploma route and achieved their baccalaureate as a result of post-RN education.

The increase in the age level of the registered nurse population is accompanied by a decline in the activity rates. Although at least three-quarters of the nurse population at each age group level are employed in nursing until the age group of 55-59 is reached, nurses are most apt to be employed at the youngest age levels. By 2000, it is anticipated that the overall activity rate would be about 72 percent compared to the rate of 76.6 percent found in the 1980 study.

Both the licensed practical nurse and registered nurse supply projections are based on assumptions which relate to trends in the behavior patterns of the nurse population. These trends indirectly take into account the labor market in which they were practicing or were entering. In general, this has been an expanding market characterized by periodic shortages, particularly for registered nurses. One result of this expanding labor market has been the ability of nurses to temporarily withdraw from the work force and then return as their family or economic conditions warranted. Studies have shown that family income requirements impacted on decisions of female married registered nurses to work or not (Roth, et al., 1978). Since the late 1970s were characterized by high inflation rates, it was hypothesized that this was one of the major factors that caused the increase in the activity rates for these nurses during that period. On the basis that continuing inflation can have the same effects in the future given the same labor market conditions as in the past, an examination was made of the impact of an annual 3 to 4 percent increase in the consumer price index on the supply of registered nurses. Under these circumstances, the supply of registered nurses would be about 2,264,400 by 2000, about 3 percent higher than the actual projection for that year of 2,079,000.

2. REQUIREMENTS FOR NURSING PERSONNEL

The examination of future requirements for this report, as in the previous reports to the Congress, is based on two approaches. One, the historical trend-based model, provides a view of requirements in the future based on an extension of past and current trends of services and resource utilization into the future modified by assumptions about how system changes might impact on these trends. The other, the criteria-based model, examines what requirements might be if judgments of appropriate resources necessary to achieve health care goals were the determinants of requirements in the future.

The basic modeling structures for both approaches evolved from a series of studies undertaken in the mid-1970s which have been described in the prior reports in this series and in individual reports of those studies. (USDHEW, DN, 1979; USDHHS, DN, 1982; USDHHS, BHPr, 1984) These models have been maintained and updated through work carried out by staff in the Bureau of Health Professions, to ensure that the resulting projections would reflect the latest trends and thinking about future directions in the health care system. The results from both models have been reviewed and revised in the interim between these last two reports to take account of new strategies within the health care system and their possible effect on requirements for nursing personnel.

The Historical Trend-Based Model

The basic structure of the historical trend-based model examines requirements for nursing personnel according to the major sectors of the health care system in which these personnel are employed: community hospitals, all other hospitals, nursing homes, physicians offices, community health, health maintenance organizations (HMOs), nursing education, and the other miscellaneous settings as a group.

In the model as it is currently revised and updated, projections are based on trends in three major categories: components of the population, provided services on a per capita basis (inpatient days, outpatient visits, etc.); and numbers of full-time equivalent registered and licensed practical nurses per unit of provided services. A large number of data sources providing information on a national basis and disaggregated to the State level are required to sustain the model and produce the necessary requirements projections. As in the supply model, data collected in the national sample surveys provide the unifying base for the discrete studies of particular aspects coming from other sources. Thus, while previously no specific projections on licensed practical nurses were produced from this model, the availability of the data from the 1983 National Sample Survey of Licensed Practical/Vocational Nurses enabled the preparation of such projections for this report.

Assumptions Underlying Projections: The dominant assumption, as indicated by the title given to the model, is that historical trends will determine the future trends that will occur in the health care system. The validity of such an assumption is dependent upon the extent to which the system is modified either directly, deliberately or as a result of some outside event impacting on the system. The base assumptions made at this time are that the utilization of health care services would maintain established trends; that the rate of RN utilization would remain at current levels or increase depending upon the trends; that licensed practical nurse to registered nurse ratios would not increase or, in some instances, would be fixed at current levels. It is also assumed there would not be licensed practical nurses employed in intensive care units or as nurse educators.

Some modification in the base line assumptions were made in order to provide what might be considered a more realistic view by taking account of occurrences in the future, given the full implementation of the Medicare prospective payment system and its effect on noninstitutional segments of the system. These were based on the evidence in data available during the initial implementation phase and on information contained in discrete reports of health care system changes. Among the modifications made were a decrease in the rate of growth in the number of patient days in intensive care units; a decrease in the rate of growth in the utilization of registered nurses in community hospital nonintensive care units after 1986 and a decrease in the licensed practical nurse to registered nurse rates in community hospitals during the early part of the projection period; a substantial increase in the rate of growth of health maintenance organization enrollments; and a substantial increase in the rate of growth for the numbers of home health visits to be made. The data resulting from the base assumptions as modified form the basis for the historical trend-based model projections summarized in the tables at the end of this chapter.

Projections to the Year 2000: The annual projections of the number of full-time equivalent registered nurses required according to historical trends, as modified by the assumptions to reflect the effects of the full implementation of the Medicare prospective payment system, indicate that by the year 2000 a total of 1,683,000 full-time equivalent nurses would be required (see table 10-23). This is about 58 percent higher than the estimated requirement for the year 1980. The projected requirements for licensed practical nurses under these circumstances were for 719,600 full-time equivalent LPN/LVNs by 2000, 68 percent more than the estimated requirements in 1980.

The requirements for registered nurses increase at a faster rate in the early part of the projection period, through 1990, and at a slower rate between 1990 and 2000. In the case of the licensed practical nurse, the rate of increase is larger in the latter part of the projection period than in the former. Requirements for licensed practical nurses in community hospitals actually decline between 1980 and 1990 as the ratio of LPNs to RNs in these hospitals declines. The number of LPNs required, in the latter period, 1990 to 2000, increases, however, as this utilization rate stabilizes. In 2000, however, the number of full-time equivalent positions in hospitals for licensed practical nurses would be lower than the requirements in the early 1980s. The slack in those positions is more than made up in nursing homes and the physician's office area (which includes the requirements for about 5,750 in 2000 in health maintenance organizations).

Although there are no areas which show losses of positions for registered nurses, the number in hospitals increases by only 23 percent by 2000 under the assumption that there would be a constraint in the rate of growth in the utilization rates of registered nurses in nonintensive care units and that the rate of increase in the number of patient days in intensive care units would decline. Large gains in the number of positions for registered nurses are shown for the nursing home area and in the community health area as the number of home health visits are expanded significantly (see table 10-24).

When the requirements for nursing personnel were projected on the base assumption that future requirements would continue changes evidenced in the trends of the last few years, the overall requirement for full-time equivalent registered nurses by the year 2000 was 1,816,000 and for licensed practical nurses, it was 794,000. Hospitals would have a requirement for about 1,042,000 full-time equivalent registered nurses and 320,000 full-time equivalent licensed practical nurses. On the other hand, a projection which takes into account the types of assumptions that were made on the results of the full implementation of the Medicare prospective payment system, which hypothesizes that the effect on overall patient days and intensive care patient days in community hospitals would be a dramatic decrease, resulted in a total requirement for about 1,581,000 full-time equivalent registered nurses and 692,000 licensed practical nurses by 2000.

The projections of national requirements are essentially an aggregate of the State-by-State projections (see table 10-25). For each of the States and the District of Columbia, trend identifications for the various employment settings are developed. Governing these trends, however, is the availability of data on a national level. Thus, in a number of instances the data used are based on sample surveys providing varying degrees of accuracy on a State level, depending upon the sampling procedures and the size of the samples. While to the best extent possible, each State's trends as evidenced by the national data source is captured, balance is maintained between these trends and the overall national trends shown for the particular health service area. Thus, while there may be differences between the total requirements obtained as a result of the aggregation of the individual State data and national requirements developed solely from national trends, these differences are not marked; a little difference is seen in the early projection years with increased differences occurring toward the latter part of the projection period.

State projections generally showed the same pattern as the national ones. There was a greater growth in the registered nurse requirements in the 1980s than in the 1990s. The licensed practical nurse pattern was the reverse of this. In all but two States and the District of Columbia the requirements increased during the course of the projections. New York, one of the two States, maintained about the same level of requirements for registered nurses throughout the projection period, although requirements continued to increase for the licensed practical nurses. The slowest rate of growth in requirements was found in the Middle Atlantic area followed by New England and the North Central portions of the country. Requirements in the South showed the greatest rate of growth throughout the projection period.

The Criteria-Based Model

In this approach, requirements are a measure of the number and levels of educational preparation of nursing personnel needed to meet a particular set of health care goals. The model is dependent upon an expert group to establish the parameters underlying the requirements projections. The planning group, working from a review of past and present practices and experience, uses its expert judgment to develop the criteria in the form of staffing and service utilization ratios, which will best accomplish the health care goals.

In the summer of 1984 such a group, consisting of experts in various areas in which nurses practice and representatives of a number of the nursing and health care services associations, was convened by the Division of Nursing. The specific charges to these individuals was to examine the criteria established previously in the light of health care goals and needs for the years 1990 and 2000, taking into account new and revised forms of delivery of care and concern about the cost of delivery of care. This was the third time the criteria have been examined since the model structure was established. The initial Panel of Expert Consultants met in 1977 and provided criteria relevant to 1982. A second Panel was called together in 1980. That Panel's orientation was toward 1990. Fuller accounts of these Panel's activities are given in previous reports.

Assumptions Underlying the Criteria: The examination of the criteria at this time preserved the same structure as the previous criteria (see tables 10-26 and 10-27). Recognizing new types of approaches to the delivery of care, e.g., "surgicenters," the Panel subsumed the needs for those under the categories traditionally included. Due to the recency of these developments, it was felt it would be difficult to distinguish between those services that would now be carried out in the new settings and those that would remain in the traditional settings. They did, however, in their single criteria, try to present an "average" which would capture the effect of what each type of setting would require. They maintained the same level and titles for nursing personnel as established in the previous criteria and in existence at the present time.

The panel expressly looked toward establishing a set of criteria which would be achievable, yet might also be a statement of what would be ideal or desirable to accomplish the health care goals and level of care they believed was needed. Thus, in some instances, staffing levels were lowered from those identified in prior reviews. These revised criteria were thought to be more achievable and realistic goals given current existing conditions.

In other instances, criteria were set at a level which might not be obtainable by 1990 or 2000 given present circumstances but it was important that the direction for change be established. This point was particularly noted in the case of the educational levels identified for registered nurses. In general, though, they ascribed to the definitions used by prior panels in establishing criteria. There is a "lower bound" and an "upper bound." The "lower bound" is defined as that which all States can achieve. For the "upper bound," it is assumed that some States will achieve the criteria and others will work toward them.

The Panel stressed that the criteria might be considered as "averages." The levels of nursing care indicated for the institutional area would apply to settings on the average but it was recognized that there would be large

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variation from one setting to another. Similarly, number of visits per day were meant as national averages and did not allow for geographic differences such as sparsely populated versus heavy population density areas.

The largest influence on nursing noted in the hospital area was that of the significant increase in the intensity of care required. It was assumed that, because of measures being taken to hold down costs in hospitals, the care provided in the past at the onset of a hospital stay, such as tests administered before surgery, would be carried out somewhere else in the health care system. Similarly, the care that was provided toward the end of the hospital episode would now be given in nursing homes, or in an ambulatory care setting, or through home health care. This, in effect, leaves the hospitals providing the highest level of care to intensely ill patients rather than the spectrum of care needs evidenced in the past.

Furthermore, it was thought that hospitalizations of "lower-acuity cases" would be less likely to occur as these problems would be handled differently. The elimination of these kinds of cases from the broad range of patients who were hospitalized in the past would add to the overall increases in the intensity of care level required for those who would be hospitalized.

The increases in the intensity level within the hospitals would require an increased use of nursing resources but this would be offset by a decrease in the total number of inpatient days. It was postulated that by 1990, the total number of inpatient days would decrease by about 15 percent from present levels, based on declines in admissions and decreases in the length-of-stay. Similarly, given the general increase in the level of care envisioned for patients throughout the hospitals, it was anticipated that the number of intensive care units and patient days within these units would no longer continue to grow as they had in the past. It was felt that very shortly, by 1985, the numbers would stabilize and hold at a steady level through the 1990s.

In reexamining the criteria for nursing homes, the group indicated that the increasing intensity of institutional based care in general, coupled with an increasing responsibility to provide extended/recuperative care after hospital discharge, would require an increase in nursing hours per resident day above that reflected in previous criteria. In addition, the average age of patients in long-term care facilities is increasing. Nursing homes serve a dual purpose -- providing maintenance care and a sophisticated level of care involving considerable technology. The inability of the present data to address these different acuity levels in the general category identified as nursing homes, hampers the development of criteria which would recognize each of these levels. Furthermore, the constraint in the monies available to finance nursing homes precludes experimentation with different types of staffing patterns. Thus, staffing in nursing homes has followed the traditional model with predominant reliance on care by licensed practical/vocational nurses and nursing aides.

To take account of the various trends and the levels of care required in nursing homes on an aggregate basis, the group did increase the total number of nursing hours slightly over those indicated in the previous criteria. However, because of present and anticipated future economic conditions as well as accounting for the total spectrum of care requirements, a significant shift was made in the nursing mix from the previous criteria toward the use of lesser skilled nursing personnel. The group felt, that even with these current adjustments, the criteria still represented important gains over the 7 to 12 minutes of RN care per resident day currently provided in nursing homes. For the upper bound, and for the year 2000, the proportion of registered nurses within the nursing complement was increased. In making these adjustments in the criteria, it was stressed that these criteria represent more realistic goals which would be definitely achievable. It was pointed out, however, that professional nurses, particularly those with specialty education in geriatrics, can make a difference to the care provided in the nursing home area.

The group felt that the examination of requirements for nursing personnel within physicians' offices had to be considered within the context of a different organizational structure for this area. They hypothesized that by 1990, 50 percent of the physicians would be in group practices of some type; and by 2000, 70 percent would be. They felt that various kinds of personnel might be present in these expanded practice settings but only registered nurses would be used among those categories considered as nursing personnel. They saw increased use of nurse practitioners, particularly by the year 2000.

The group anticipated a definite increase in the use of various forms of community health care arising from current trends toward deinstitutionalizing persons with a number of types of disabilities, both physical and mental, and efforts to contain costs by treating and caring for individuals in the home and ambulatory care settings. Drawing upon the current experience of those who have direct involvement in home health care programs, the group envisioned a sharp increase in the proportion of those discharged from hospitals who would require home health care over that indicated in previous criteria. As a result of shorter lengths-of-stay in hospitals, a considerable number of patients will be sent home still requiring care of a sophisticated nature. The aging of the population, coupled with increased numbers of older people living alone, was also seen as adding to the requirements for home health care, as was the increase within the community of those under 65 with disabilities which prevent them from caring for themselves completely .

In viewing the care needs of the population for home health care, the group felt that inadequate consideration had been given in the past to the use of home health aides. Both registered nurses and home health aides were considered important in caring for the needs of these individuals. The inclusion of this cadre of home health aides led to increased needs for registered nurses in the inservice, staff development area as well because of the necessity to train and maintain the skills of the home health aides as well as provide educational support for registered nurses.

An area viewed as important to the prevention of disease and promotion of health was occupational health nursing. In reviewing those criteria in the light of what would be required for a comprehensive occupational health program, the panel examined particularly the recommendations put forth by the American Association of Occupational Health Nurses (AAOHN) in 1982 and felt that these formed a reasonable basis for staffing criteria. In considering how these criteria could be achieved realistically, it was recognized that three-fourths of the industrial settings had fewer than 20 employees. However, it was felt that an approximation of the criteria set down can be achieved through innovative approaches such as a group of plants getting together to obtain nursing services through contractual arrangements with community health service agencies such as the visiting nursing services and official health agencies (Moses, 1985).

The criteria were considered in terms of whether they would be appropriate for 1990 and/or 2000 according to goals for the two time frames and in consideration of possible changes between those two dates. Therefore, in some instances different criteria were established for 2000 than for 1990. Both sets of criteria are reproduced in this report in the tables following this chapter.

Projections to the Year 2000: In establishing the criteria, the goals for a particular date are set and, therefore, annual projections would not be appropriate for the intervening years between the date on which the criteria were set up and the date for which they were established. Thus, projection of requirements for the future, using the criteria-based model, are expressed only for the specific years under consideration when the criteria were set.

Based on the criteria established for 1990, and the underlying assumptions the panel made about the decreases in inpatient days, the projection of requirements for 1990 in the "lower bound" was 1,733,000 full-time equivalent registered nurses; 321,000 full-time equivalent licensed practical nurses, and 1,398,000 full-time equivalent aides. For the year 2000, the respective totals were 2,328,000; 423,000, and 1,493,000. See table 10-28.

As shown in table 10-29, about 33 percent of the registered nurse positions, or 568,000 full-time equivalent positions in 1990 would be for associate degree or diploma nurses. About 46 percent of the positions, or 803,000, called for baccalaureate prepared-nurses while 339,000 (20 percent) would require master's-prepared nurses. About 3 out of every 10, or 101,000, of the master's-prepared nurses would be expected to have nurse practitioner preparation, as that would be the number required to function as nurse practitioners. The 1990 projections also called for 22,000 doctorally prepared full-time equivalent registered nurse positions.

For 2000, the proportion of nurses with different levels of education would be somewhat similar to the 1990 requirements. Positions for associate degree or diploma-prepared nurses numbered 732,000; positions for baccalaureate-prepared nurses, 1,080,000; and master's-prepared nurses, 479,000. Thirty-five percent, or 167,000, of the master's-prepared nurses would be nurse practitioners. A 61 percent increase, though, would be required for the doctorally prepared nurses for a total of 36,000 full-time equivalent positions.

The State-by-State requirements projections for the "lower bound" criteria are included in tables 10-29 and 10-30. Also tables 10-30 and 10-31 show the projected requirements under the assumption that all States would meet all the "upper bound" criteria for each of the 2 respective years for which the criteria were established.

3. National Requirements from Two Perspectives

The two approaches taken to requirements are fundamentally different. The view of the historical trend-based model of the future is governed by past utilization. While to some extent system changes in the future are recognized, the impact of these evolves out of the past trends. Requirements projections from the criteria-based model, on the other hand, are based on judgments by an expert group as to what would be the most appropriate use of resources to accomplish their established health care goals. To examine what effect these two approaches have on anticipated requirements in the future, the lower bound projections are used for the criteria-based model since those criteria were established at a level the expert panel felt all States should achieve by the given year.

For the year 1990, the total full-time equivalent registered nurse requirements projected under the criteria-based model of 1,733,000 was about 22 percent higher than the projection of 1,414,000 for the historical trend-based model. For the year 2000, the difference between the two projections for full-time equivalent registered nurses increased to 38 percent. The projections for full-time equivalent licensed practical nurse positions were much further apart. Thus, the projection from the historical trend-based model which carried forward into the future past trends in the use of licensed practical nurses, was 64 percent higher than the projection under the criteria-based model assumptions for 1990. For 2000, the difference increased to 70 percent. Looking at these totals only does not indicate where the major differences between the two projections series occur, however.

In 1990, the criteria-based model projection for hospital-based registered nurses is lower than the projection under the historical trend-based assumptions. In 2000, the situation is reversed, with the criteria-based projection being slightly higher than the other. To some extent, this is related to the panel's assumptions of very significant declines in overall patient days and intensive care days in community hospitals. When these assumptions are taken into account in the historical-trend based model, requirements for registered nurses in hospitals also declined significantly so that the criteria-based model projection for registered nurses in hospitals was about 10 percent higher than that in the historical trend-based model, and in 2000, the difference increased to 16 percent. Both models, however, project a fundamental change in the proportion of the overall requirements for all registered nurses that would be involved in hospital-based practice from the current proportion. According to the historical trend-based model, 52 percent of the full-time equivalent positions would be in hospitals in 2000. The criteria-based model placed 39 percent of the positions in hospitals.

The historical trend-based model provided large increases in the number of nurses to be employed in nursing home and community health settings. However, these two areas show large differences between the projections from the two models. In their review of the criteria for staffing in nursing homes, the panel looked to strike a balance between the economics of the nursing homes, current staffing patterns, and the necessary requirements to improve conditions in the homes and move from a mode of primarily custodial care to one which would increase the therapeutic content of the nursing care provided. The historical trend-based model, on the other hand, essentially maintains current staffing trends.

In the community health area, the panel not only gave particular attention to the expanded needs for home health, which were also taken into account in the historical trend-based model projections, but they also examined specifically those areas that contribute to the Nation's goals of health promotion and disease prevention. For example, the criteria for the occupational health area leads to a requirement of about 141,000 full-time equivalent registered nurses in 1990 in order to provide a comprehensive occupational health program, far beyond what an extension of current trends would provide.

On the other hand, the criteria-based model calls for sharply fewer nurses in physicians' offices (including HMOs) than does the historical trend-based model. This is true even when both registered nurses and licensed practical nurses are considered together.

Ultimately the extent to which future requirements for nursing personnel would more nearly approximate the projections from the criteria-based model or the historical trend-based model rests on the degree to which historical patterns or expert judgment of desirable health care goals and resources govern in the health care of the future. Furthermore, the conclusions drawn by both these modeling efforts need to be considered within the context of the fundamental changes that the system is undergoing at this time and the lack of sufficient data to be able to capture what definite impacts these changes will have on resource requirements. Neither past trends nor current judgments about care needs and delivery may reasonably reflect the future. It may be several years before clear indications of things to come can be determined.

4. Comparative Analysis of Supply and Requirements

Taking into account the future projections of requirements from the two perspectives presented and the available supply, given the anticipated flow of graduates and current trends in the work patterns of the registered and licensed practical nurse population, the following picture emerges of the full-time equivalent nurse supply and requirements for 1990 and 2000:

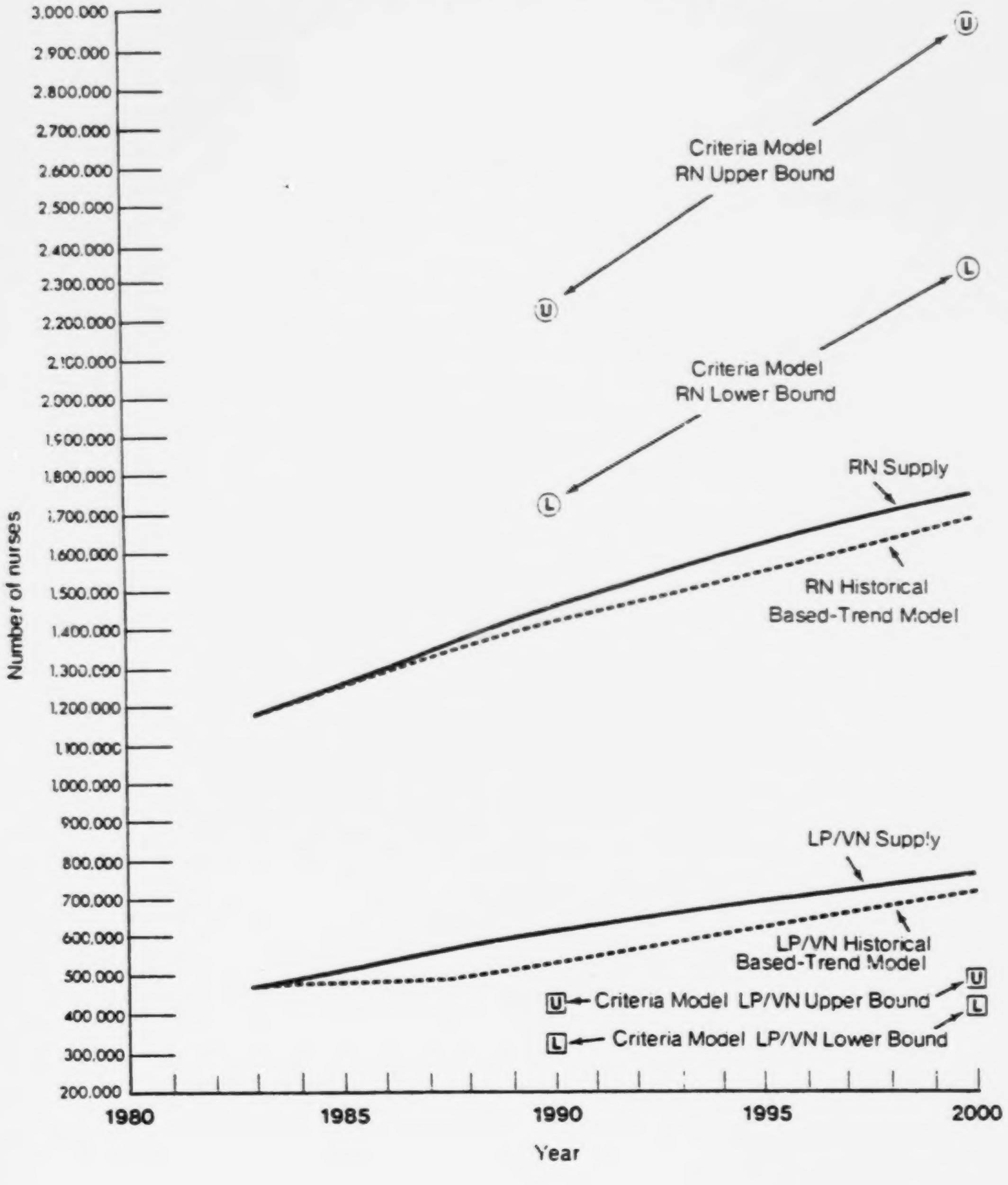
	1990	2000
Registered Nurse		
Supply	1,454,000	1,750,000
Historical trend-based requirements	1,414,000	1,683,000
Criteria-based requirements (lower bound)	1,733,000	2,328,00
Licensed Practical/Vocational Nurse		
Supply	608,000	756,000
Historical trend-based requirements	527,000	720,000
Criteria-based requirements (lower bound)	321,000	423,000

From these data, it would appear that no real imbalances exist between the potential available supply and the historical trend-based requirements projections for registered nurses. The criteria-based model presents a somewhat different picture in that requirements for registered nurses are somewhat higher than the potential supply. In the main, however, as indicated in the section on requirements, the differences between the two requirements projections can be attributed to a large extent to concerns leading to fundamental changes in the objectives for nursing care in such areas as nursing homes and community health. Thus, in examining the differences between the supply and the criteria-based requirements, consideration should be given to the extent to which the premises and goals upon which these requirements are based could and will be achieved.

For licensed practical nurses, conclusions drawn from the historical trend-based model find that by 2000 supply and requirements appear to be in balance, although there would be an oversupply for 1990. Under the assumptions in the criteria-based model, however, the potential supply of licensed practical nurses would exceed the requirements. As pointed out earlier in the discussion on issues in licensure, nursing groups, both professional and practical, envision fundamental changes for practical nurses in the future. The impact of these on supply and requirements is dependent on the degree to which these changes are accepted and can be implemented.

Significant imbalances can be noted, however, when comparisons are made between the projected full-time equivalent registered nurse supply and the criteria-based requirements projections when they are examined according to the education preparation levels of the nurses. In summary, the projections are:

Figure 10-4 - PROJECTIONS OF SUPPLY OF FULL-TIME EQUIVALENT REGISTERED AND LICENSED PRACTICAL/VOCATIONAL NURSES. HISTORICAL TREND BASED REQUIREMENTS AND 1990 AND 2000 CRITERIA-BASED REQUIREMENTS.



SOURCE : Projections prepared by Division of Nursing, Health Resources and Services Administration, Department of Health and Human Services, 1985

	1990	2000
Associate degree/diploma		
Supply	936,000	1,070,000
Requirements	568,000	732,000
Baccalaureate		
Supply	413,000	510,000
Requirements	803,000	1,080,000
Master's and Doctorate		
Supply	106,000	171,000
Requirements	361,000	515,000

As can be seen, projected requirements for full-time equivalent registered nurses with baccalaureate degrees are about twice the projected supply for 1990 and 2000. For nurses with graduate degrees, the requirements are about three times higher than the projected supply.

These requirements reflect both the aggregated nursing resources resulting from the criteria the expert panel developed in relation to their health care goals and their judgment of the appropriate level of qualification to carry out these goals. In relation to the latter point as noted earlier in this report, the panel recognized that the major revision in the educational system that would be required is unlikely to be obtained by 1990 or even by 2000 but that the expression of these goals provide a clear direction for change. In addition, as was noted for the practical nurses, the fundamental changes envisioned by the nursing groups outlined in the licensure issues can have a major impact on both the educational distribution of the supply and the requirements in the future. The implications of this professional and practical nursing resolution have not been directly taken into account in the assumptions underlying the projections.

The historical trend-based model does not measure the educational preparation required of registered nurses. However, projections from that model show significant growth in requirements for the same two employment areas as the criteria-based model shows: nursing homes and community health. The community health area, particularly, would have a direct influence on the number of nurses required with baccalaureate degrees. Baccalaureate programs are the only types of nursing education program that prepare students to function in community settings as well as in institutional facilities.

The data quoted above relate to an aggregate of individual State supply and requirements projections. Each State experiences different growth and development patterns. In some cases, individual States may be in balance or may be surplus or deficit States when future projections of requirements are compared to future available supply projections. These data should be examined within the context of the fact that the data on available supply provide no recognition or adjustment for what a changing employment situation may mean to a nurse's decision to enter, or more importantly, reenter nursing employment. The available supply at some future point in time would really be related to the cumulated effect of nursing employment decisions over the years.

According to the estimates for 1983, approximately 30,000 full-time equivalent registered nurses who had been inactive for more than 5 years returned to employment in the country. Under the assumptions used to project the available supply for the future, this number grew to about 36,000 by 1990 and over 40,000 by 2000. The total difference between the estimated full-time equivalent supply and the historical trend-based requirements projection for 1990 would be eliminated if the rate of return to practice of those nurses who had been inactive for a fairly long time had been reduced by 25 percent. In the three-fifths of the States that were "surplus" States, i.e., the available supply was greater than the requirements, the differences between supply and requirements for the most part were of the magnitude where shifts in the decision of a group such as this could be the factor in the balance between supply and requirements. The full-time equivalent requirements projected by the lower bound criteria in the criteria-based model show that there are some 37 "deficit" States in terms of available registered nurse supply and 14 "surplus" by 1990.

These figures would increase to 40 and 11, respectively, in 2000. In a little over half of the 14 States that are projected to have a surplus in 1990, the surplus would be eliminated by a change in the rate in which the long-term inactives returned to practice. Furthermore, in all these instances, changes in mobility patterns may materially affect the balance in supply and requirements in any one State.

Further uncertainties as to the future balance between supply and requirements rests in the changes in the health care system itself. The emerging and evolving health care settings are at this point only beginning to evidence themselves and have as yet to be described quantitatively; therefore estimates of the future requirements for nurses, as stated in historical-based terms, cannot be fully taken into account. The decline in the amount of care to be provided in hospitals seems certain. But until factors such as migration, new and growing areas of employment and the need for more highly skilled and intensive nursing care services in established care settings outside of the hospital are quantified, the question of the balance between supply and requirements remains to some extent unanswered.

E. SUMMARY AND CONCLUSIONS

1. Recommendations

Recommendation 1: Supply and Requirements

Twenty years of Federal support to increase the Nation's supply of well prepared nurses has brought supply into balance with demand in so far as aggregate numbers are concerned. States, the health care industry, and the private sector must now assume responsibility for using resources developed through Federal assistance to assure a continuing supply of entrants into the profession and to rectify imbalances in geographic and specialty distribution. In order for Federal and State policy-makers to have accurate and timely information for making manpower decisions, the Federal Government supports the conduct of national studies, the refinement of forecasting methodologies, and the collection and analysis of data with special attention to filling identified deficits in currently available information. Federal intervention will continue to be directed to stimulating the non-Federal sector to address national priorities such as increasing the representation of minorities and individuals from non-traditional backgrounds in the nursing work force. Student assistance will be maintained through programs administered by the Department of Education and through anticipated resources from the Nursing Student Loan Program revolving fund accounts.

Recommendation 2: Nursing Education and Research

The Nurse Education Amendments of 1985, (P.L. 99-92) were enacted on August 16, 1985. The reports accompanying this newly enacted legislation recognize that unprecedented advances in scientific knowledge and the application of new technologies have increased the complexity of patient care and have created a critical need for nurses with specialized education in administration, primary care, geriatrics, home and community based nursing and for other areas of our health care system. Since these authorities have so recently been enacted, no further legislative action is recommended at this time.

The Health Research Extension Act of 1985 (P.L. 99-158) created a National Center for Nursing Research at NIH. In keeping with the statutory requirement, programs supporting nursing research and research training administered by the Division of Nursing will be relocated at NIH.

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Table 10-1. EDUCATIONAL PROGRAMS PREPARING REGISTERED NURSES IN THE UNITED STATES, 1970-71 TO 1983-84

Academic year	Programs 1	Enrollments 1	Admissions 2	Graduations 2
TOTAL:				
1970-71	1,340	162,924	78,524	46,455
1975-76	1,362	248,171	112,174	77,065
1976-77	1,358	247,044	112,523	77,755
1977-78	1,356	245,390	110,950	77,874
1978-79	1,358	239,486	107,476	77,132
1979-80	1,374	234,659	105,952	75,523
1980-81	1,385	230,966	110,201	73,985
1981-82	1,401	234,995	115,279	74,052
1982-83	1,432	242,035	120,579	77,408
1983-84	1,466	250,553	(3)	(3)
ASSOCIATE DEGREE:				
1970-71	437	43,855	29,433	14,534
1975-76	608	88,121	52,232	34,625
1976-77	632	91,004	53,610	36,289
1977-78	645	91,102	52,991	36,556
1978-79	666	91,527	53,366	36,264
1979-80	678	92,069	53,633	36,034
1980-81	697	94,060	56,899	36,712
1981-82	715	100,019	60,423	38,289
1982-83	742	105,324	63,947	41,849
1983-84	764	109,605	(3)	(3)
DIPLOMA:				
1970-71	636	70,412	28,792	22,065
1975-76	428	60,213	23,622	19,861
1976-77	390	56,091	22,243	18,014
1977-78	367	52,858	20,611	17,131
1978-79	344	48,059	18,499	15,820
1979-80	333	43,651	16,905	14,495
1980-81	311	41,048	17,494	12,903
1981-82	303	41,009	18,928	11,682
1982-83	288	42,348	19,368	11,704
1983-84	281	42,007	(3)	(3)
BACCALAUREATE: 4				
1970-71	267	48,657	20,299	9,856
1975-76	326	99,837	36,320	22,579
1976-77	336	99,949	36,670	23,452
1977-78	344	101,430	37,348	24,187
1978-79	348	99,900	35,611	25,048
1979-80	363	98,939	35,414	24,994
1980-81	377	95,858	35,808	24,370
1981-82	383	93,967	35,928	24,081
1982-83	402	94,363	37,264	23,855
1983-84	421	98,941	(3)	(3)

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1 As of October 15 of each year.
2 Time period for the academic year is August 1 through July 31.
3 Data not available.
4 Includes programs and students in generic master's and doctoral programs, where such are in existence.

SOURCE: National League for Nursing, Nursing Student Census, 1984.

Table 10-2. PRACTICAL NURSING EDUCATIONAL PROGRAMS AND STUDENTS IN THE UNITED STATES, 1970-1971 TO 1983-1984

Academic year	Programs [1]	Enrollments [1]	Admissions [2]	Graduations [2]
1970-71	1,233	52,526	59,128	37,954
1975-76	1,315	58,460	61,353	47,145
1976-77	1,318	58,423	60,166	46,614
1977-78	1,319	56,943	60,610	45,350
1978-79	1,310	54,543	57,081	44,235
1979-80	1,298	52,202	56,316	41,892
1980-81	1,299	52,565	58,479	41,002
1981-82	1,309	55,024	60,426	43,299
1982-83	1,292	57,367	61,453	45,174
1983-84	1,292	55,446	(3)	(3)

[1] As of October 15.
[2] Time period is from August 1 through July 31.
[3] Data not available.

SOURCE: National League for Nursing, NLN Nursing Data Book 1983-84 and State-Approved Schools of Nursing LPN/LVN 1984.

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Table 10-3. ADMISSIONS TO AND GRADUATIONS FROM NURSING EDUCATIONAL PROGRAMS PREPARING REGISTERED NURSES, BY TYPE OF PROGRAM AND GEOGRAPHIC AREA, 1982-83

	Admissions				Graduations			
Geographic area	Total	Baccalaureate[1]	Associate degree	Diploma	Total	Baccalaureate[1]	Associate degree	Diploma
United States	120,579	37,264	63,947	19,368	77,408	23,855	41,849	11,704
New England	7,705	3,034	3,008	1,663	4,921	1,879	2,016	1,036
Connecticut	1,359	474	550	335	914	343	333	238
Maine	625	183	286	156	446	122	242	82
Massachusetts	4,057	1,657	1,474	926	2,612	967	1,047	608
New Hampshire	506	209	218	79	292	127	94	71
Rhode Island	822	405	250	167	480	252	191	37
Vermont	336	106	230	-	177	68	109	-
Middle Atlantic	22,708	6,016	10,833	5,374	13,928	4,613	6,328	3,057
New Jersey	3,653	838	1,656	1,159	2,014	550	909	555
New York	11,899	3,330	7,242	1,265	7,111	2,388	4,014	709
Pennsylvania	7,156	1,848	1,935	2,950	4,873	1,675	1,405	1,793
South Atlantic	19,083	5,183	11,908	1,905	11,406	3,293	7,075	1,038
Delaware	597	295	203	99	395	184	147	64
District of Columbia	563	443	120	-	284	227	57	-
Florida	4,269	812	3,278	181	2,917	451	2,346	120
Georgia	2,358	589	1,568	201	1,310	392	788	130
Maryland	2,266	627	1,346	293	1,441	443	841	157
North Carolina	3,179	775	2,082	309	1,946	667	1,090	189
South Carolina	1,391	294	1,021	32	705	232	459	14
Virginia	2,901	997	1,237	635	1,612	539	796	277
West Virginia	1,559	351	1,053	155	796	158	551	87
East South Central	10,130	3,118	5,916	1,068	5,809	1,636	3,524	649
Alabama	3,297	1,318	1,793	186	1,778	706	941	131
Kentucky	1,970	385	1,585	-	1,290	189	994	107
Mississippi	1,794	562	1,202	30	949	293	630	26
Tennessee	3,069	853	1,336	852	1,792	448	959	385
West South Central	10,671	3,879	5,786	886	5,824	2,242	3,062	520
Arkansas	1,375	430	759	186	769	163	537	69
Louisiana	1,929	738	795	396	957	393	378	186
Oklahoma	1,345	476	869	-	930	306	583	41
Texas	5,977	2,235	3,363	304	3,168	1,380	1,564	224
East North Central	23,816	7,392	11,239	5,139	16,095	4,792	8,047	3,256
Illinois	6,393	1,703	3,285	1,405	4,479	1,182	2,338	959
Indiana	3,180	1,291	1,456	433	2,140	771	1,143	226
Michigan	4,214	1,161	2,537	516	3,229	945	1,861	423
Ohio	6,609	1,577	2,704	2,328	4,317	992	1,985	1,367
Wisconsin	3,399	1,660	1,257	457	1,930	902	747	281
West North Central	11,248	3,277	5,139	2,832	7,874	2,522	3,533	1,819
Iowa	2,454	579	1,248	627	1,702	417	892	393
Kansas	1,434	530	709	195	1,029	483	438	108
Minnesota	2,340	677	1,412	251	1,722	588	919	215
Missouri	2,668	584	1,037	1,047	1,808	480	705	623
Nebraska	1,029	299	304	426	782	180	294	308
North Dakota	603	328	133	142	398	191	94	113
South Dakota	720	280	296	144	433	183	191	59
Mountain	4,930	1,941	2,908	141	3,197	912	2,243	42
Arizona	1,401	695	706	-	869	255	614	-
Colorado	1,208	546	581	81	607	227	338	42
Idaho	368	43	325	-	295	43	252	-
Montana	459	307	152	-	212	127	85	-
Nevada	309	58	191	60	186	34	152	-
New Mexico	601	153	448	-	384	74	310	-
Utah	439	68	371	-	567	128	439	-
Wyoming	205	71	134	-	77	24	53	-
Pacific	10,288	2,656	7,212	420	8,354	1,966	6,031	357
Alaska	169	104	65	-	78	36	42	-
California	7,263	1,756	5,229	278	5,958	1,189	4,495	274
Hawaii	288	144	144	-	180	70	110	-
Oregon	981	118	721	142	866	210	573	83
Washington	1,587	534	1,053	-	1,272	461	811	-

[1] Includes students in a few generic programs leading to a masters or doctoral degree.

SOURCE: National League for Nursing, Nursing Students Census, 1984.

Table 10-4. ADMISSIONS TO AND GRADUATIONS FROM PRACTICAL NURSING EDUCATIONAL PROGRAMS BY GEOGRAPHIC AREA, 1982-83

Geographic area	Admissions 1	Graduations 1
United States	61,453	45,174
New England	2,405	1,829
Connecticut	420	229
Maine	235	247
Massachusetts	1,206	913
New Hampshire	208	200
Rhode Island	130	111
Vermont	206	129
Middle Atlantic	9,692	6,800
New Jersey	1,745	1,171
New York	4,386	2,924
Pennsylvania	3,561	2,703
South Atlantic	10,379	7,288
Delaware	193	82
District of Columbia	144	71
Florida	2,713	2,148
Georgia	2,066	1,461
Maryland	618	387
North Carolina	1,200	929
South Carolina	935	515
Virginia	1,825	1,149
West Virginia	685	546
East South Central	5,234	3,527
Alabama	2,078	1,226
Kentucky	1,098	708
Mississippi	912	657
Tennessee	1,146	936
West South Central	10,232	6,421
Arkansas	1,331	1,181
Louisiana	2,122	1,109
Oklahoma	1,097	721
Texas	5,682	3,410
East North Central	9,763	7,854
Illinois	2,780	2,259
Indiana	1,119	857
Michigan	1,749	1,488
Ohio	3,056	2,333
Wisconsin	1,059	917
West North Central	5,599	4,711
Iowa	882	809
Kansas	562	716
Minnesota	1,573	1,118
Missouri	1,312	1,073
Nebraska	636	468
North Dakota	339	282
South Dakota	295	245
Mountain	2,282	1,987
Arizona	424	384
Colorado	628	511
Idaho	138	174
Montana	240	132
Nevada	59	67
New Mexico	258	294
Utah	428	339
Wyoming	107	86
Pacific	5,823	4,793
Alaska	24	12
California	4,471	3,489
Hawaii	122	128
Oregon	228	358
Washington	978	806

1 Time period is August 1 through July 31 for the academic year.

SOURCE: National League for Nursing, State-Approved Schools of Nursing, LPN/LVN 1984.

Table 10-5. NURSES ADMITTED TO THE UNITED STATES, BY IMMIGRATION STATUS, SELECTED FISCAL YEARS, 1974-1984

Immigration status	1974	1976	1978	1982	1984
Total immigrant nurses	5,331	6,421	4,943	4,701	3,648
Total occupational preference	2,137	2,763	1,493	1,755	1,256
Third preference admissions	1,688	2,004	731	586	286
Adjustments	355	715	238	567	438
Sixth preference admissions	32	11	45	108	203
Adjustments	62	33	479	494	329
All others	3,194	3,658	3,450	2,946	2,392

SOURCE: Annual reports of Immigration and Naturalization Service, Department of Justice.

Table 10-6. PROFESSIONAL NURSES ADMITTED AS IMMIGRANTS[1], BY COUNTRY OF LAST PERMANENT RESIDENCE, SELECTED FISCAL YEARS, 1974 - 1984

Country of last residence	1974	1976	1978	1982	1984
All countries	5,331	6,421	3,779	4,701	3,648
Europe	834	965	646	735	614
Germany	111	128	145	128	96
Ireland	95	50	12	30	36
United Kingdom	394	456	312	380	328
Other	234	331	177	197	154
Asia	3,457	4,460	2,153	2,716	1,994
Taiwan	125	72	102	83	72
India	827	1,236	79	429	162
Korea	988	821	319	171	111
Philippines	997	1,748	1,372	1,685	1,393
Thailand	235	230	33	32	18
Other	285	353	248	316	238
Africa	124	155	58	97	100
Oceania	73	82	36	66	70
North and Central America	715	607	781	977	776
Canada	333	293	399	456	380
Jamaica	105	87	124	186	158
Trinidad and Tobago	-	50	22	26	14
Other	277	177	236	309	224
South America	128	92	105	110	94
Guyana	-	38	36	67	38
Other	-	54	69	43	56

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[1] Permanent resident aliens.

SOURCE: Annual reports of Immigration and Naturalization Service, Department of Justice.

Table 10-7. LICENSED PRACTICAL/VOCATIONAL NURSE POPULATION IN EACH STATE AND AREA, BY ACTIVITY STATUS: NOVEMBER 1983

Geographic area	Total number in sample	Licensed practical nurse population					
		Total	Employed as LP/VN Number	Employed as LP/VN Percent	Not employed as LP/VN Number	Not employed as LP/VN Percent	Employed nurses per 100,000[1] population
United States	17,235	781,506	539,463	69.0	242,042	31.0	231
New England	1,553	46,333	33,004	71.2	13,329	28.2	264
Connecticut	262	10,302	6,985	67.8	3,317	32.2	223
Maine	261	4,139	3,154	76.2	985	23.8	275
Massachusetts	449	23,018	16,553	71.9	6,465	28.1	287
New Hampshire	182	3,250	2,114	65.0	1,136	35.0	220
Rhode Island	206	3,364	2,488	73.9	877	26.1	261
Vermont	173	2,259	1,710	75.7	549	24.3	326
Middle Atlantic	2,005	137,040	82,885	60.5	54,154	39.5	224
New Jersey	388	22,794	14,212	62.3	8,582	37.7	190
New York	854	64,333	38,321	59.6	26,011	40.4	217
Pennsylvania	763	49,913	30,352	60.8	19,561	39.2	255
South Atlantic	2,744	121,494	86,872	71.5	34,622	28.5	224
Delaware	149	1,563	1,170	74.8	394	25.2	193
District of Columbia	127	2,245	1,719	76.6	526	23.4	276
Florida	578	33,687	23,954	71.1	9,733	28.9	224
Georgia	306	22,528	15,114	67.1	7,414	32.9	264
Maryland	274	10,215	6,770	66.3	3,445	33.7	158
North Carolina	363	17,962	13,310	74.1	4,652	25.9	219
South Carolina	282	9,200	7,042	76.5	2,158	23.5	216
Virginia	389	17,934	13,042	72.7	4,891	27.3	235
West Virginia	276	6,161	4,752	77.1	1,409	22.9	242
East South Central	1,286	56,050	41,598	74.2	14,453	25.8	278
Alabama	326	16,892	12,295	72.8	4,596	27.2	311
Kentucky	297	9,099	7,280	80.0	1,819	20.0	196
Mississippi	302	10,287	7,552	73.4	2,735	26.6	292
Tennessee	361	19,772	14,470	73.2	5,302	26.8	309
West South Central	1,756	103,123	70,671	68.5	32,452	31.5	274
Arkansas	274	11,527	7,788	67.6	3,739	32.4	335
Louisiana	305	15,600	11,513	73.8	4,087	26.2	259
Oklahoma	292	10,901	7,835	71.9	3,066	28.1	238
Texas	885	65,096	43,536	66.9	21,560	33.1	277
East North Central	2,348	135,561	94,979	70.1	40,582	29.9	229
Illinois	474	31,248	19,855	63.5	11,393	36.5	173
Indiana	363	13,814	10,546	76.3	3,268	23.7	192
Michigan	502	34,125	23,299	68.3	10,826	31.7	257
Ohio	661	41,228	29,542	71.7	11,686	28.3	384
Wisconsin	348	15,146	11,737	77.5	3,410	22.5	247
West North Central	2,177	64,495	48,729	75.6	15,765	24.4	280
Iowa	361	10,794	7,692	71.3	3,102	28.7	265
Kansas	243	6,624	5,327	80.4	1,297	19.6	220
Minnesota	435	18,795	13,842	73.6	4,954	26.4	334
Missouri	362	16,182	12,725	78.6	3,457	21.4	256
Nebraska	302	6,019	4,568	75.9	1,451	24.1	286
North Dakota	274	3,251	2,567	79.0	684	21.0	378
South Dakota	200	2,829	2,009	71.0	820	29.0	287
Mountain	1,643	32,882	21,386	65.0	11,496	35.0	173
Arizona	262	7,416	4,896	66.0	2,519	34.0	165
Colorado	219	8,718	5,252	60.2	3,466	39.8	167
Idaho	211	3,445	2,169	62.9	1,277	37.1	219
Montana	244	3,001	1,786	59.5	1,214	40.5	219
Nevada	142	1,785	1,249	70.0	536	30.0	140
New Mexico	162	3,714	2,659	71.6	1,055	28.4	190
Utah	233	3,698	2,617	70.8	1,081	29.2	162
Wyoming	170	1,105	785	68.6	347	31.4	147
Pacific	1,743	84,528	59,339	70.2	25,190	29.8	176
Alaska	119	1,025	569	55.5	456	44.5	119
California	843	60,757	44,721	73.6	16,036	26.4	178
Hawaii	185	2,539	1,770	69.7	770	30.3	173
Oregon	260	5,889	4,170	70.8	1,720	29.2	157
Washington	336	14,317	8,109	56.6	6,209	43.4	189

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[1] Population data used for computation of nurse-population ratios were based on estimates of resident population as of July 1, 1983 in the publication of U.S. Department of Commerce, Bureau of the Census, Estimates of the Population of States, by Age: July 1, 1981 to 1983, Series P-25, No. 951, Issued May 1984.

SOURCE: U.S. Department of Health and Human Services, Division of Nursing.
First National Sample Survey of Licensed Practical and Vocational Nurses, 1983.
Accession No. HRP 0906275, National Technical Information Service, Springfield, VA, 1984.

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Table 10-8. REGISTERED NURSE POPULATION IN EACH STATE AND AREA, BY ACTIVITY STATUS, NOVEMBER 1980

Geographic area	Total number in sample	Registered nurse population					Employed nurses per 100,000 population[2]
		Total[1]	Employed in nursing		Not employed in nursing		
			Number	Percent	Number	Percent	
United States	30,373	1,662,382	1,272,851	76.6	388,537	23.4	560
New England	3,026	145,457	109,116	75.0	36,294	25.0	882
Connecticut	633	33,451	26,083	78.0	7,367	22.0	838
Maine	410	10,159	7,583	74.6	2,553	25.1	673
Massachusetts	940	76,926	57,052	74.2	19,874	25.8	993
New Hampshire	378	10,179	7,368	72.4	2,812	27.6	798
Rhode Island	356	9,295	7,025	75.6	2,245	24.2	740
Vermont	309	5,447	4,005	73.5	1,442	26.5	782
Middle Atlantic	3,273	341,346	252,721	74.0	88,374	25.9	686
New Jersey	794	63,630	46,768	73.5	16,862	26.5	634
New York	1,337	156,755	122,184	77.9	34,439	22.0	695
Pennsylvania	1,142	120,961	83,769	69.3	37,073	30.6	705
East North Central	4,318	298,679	231,557	77.5	67,031	22.4	555
Illinois	1,034	86,196	66,997	77.7	19,109	22.2	586
Indiana	651	32,464	25,379	78.2	7,086	21.8	462
Michigan	832	66,162	48,427	73.2	17,735	26.8	523
Ohio	1,051	79,187	61,841	78.1	17,346	21.9	573
Wisconsin	750	34,669	28,913	83.4	5,756	16.6	612
West North Central	3,852	135,374	111,206	82.2	24,167	17.9	646
Iowa	650	24,538	19,600	80.5	4,758	19.5	673
Kansas	503	18,010	14,574	80.0	3,436	19.1	616
Minnesota	831	38,327	32,184	84.0	6,143	16.0	788
Missouri	643	30,835	25,635	83.1	5,199	16.9	521
Nebraska	546	12,928	10,325	79.9	2,602	20.1	657
North Dakota	349	5,169	4,264	82.5	904	17.5	652
South Dakota	330	5,748	4,623	80.4	1,125	19.6	670
South Atlantic	5,151	245,423	186,480	76.0	58,684	23.9	502
Delaware	245	5,542	3,832	69.2	1,710	30.8	643
Dist. of Columbia	220	9,115	8,462	92.8	615	6.7	1,328
Florida	929	69,390	49,245	71.0	20,145	29.0	499
Georgia	557	30,420	24,756	81.4	5,664	18.6	452
Maryland	670	33,059	24,639	74.6	8,297	25.1	583
North Carolina	761	34,698	27,536	79.4	7,044	20.3	468
South Carolina	561	16,410	12,537	76.4	3,873	23.6	401
Virginia	818	34,966	26,138	74.8	8,828	25.2	487
West Virginia	390	11,844	9,336	78.8	2,508	21.2	479
East South Central	1,903	76,607	62,411	81.5	14,003	18.3	425
Alabama	501	19,785	16,026	81.0	3,758	19.0	411
Kentucky	481	19,994	16,972	84.9	2,980	14.9	463
Mississippi	381	11,166	9,052	81.1	2,085	18.7	359
Tennessee	540	25,662	20,360	79.3	5,179	20.2	443
West South Central	2,329	116,252	87,476	75.3	28,730	24.7	366
Arkansas	356	11,220	8,405	74.9	2,815	25.1	366
Louisiana	565	18,939	14,556	76.9	4,383	23.1	345
Oklahoma	511	13,404	10,509	78.4	2,869	21.4	346
Texas	897	72,688	54,006	74.3	18,643	25.7	377
Mountain	3,102	82,111	61,214	74.6	20,883	25.4	536
Arizona	522	22,732	16,685	73.4	6,047	21.6	611
Colorado	639	24,301	17,820	73.3	6,481	26.7	616
Idaho	345	5,789	4,062	70.2	1,726	29.8	429
Montana	423	6,544	4,824	73.7	1,719	26.3	612
Nevada	279	4,801	3,950	82.3	851	17.7	489
New Mexico	293	6,805	5,478	80.5	1,328	19.5	420
Utah	337	7,974	6,045	75.8	1,914	24.0	411
Wyoming	264	3,166	2,350	74.2	816	25.8	495
Pacific	3,421	221,134	170,672	77.2	50,351	22.8	535
Alaska	233	3,018	1,948	64.6	1,069	35.4	483
California	1,472	155,739	122,176	78.4	33,452	21.5	514
Hawaii	328	6,384	4,763	74.6	1,620	25.4	492
Oregon	655	20,922	17,208	82.2	3,715	12.8	652
Washington	733	35,071	24,576	70.1	10,494	29.9	592

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[1] Includes an estimated 994 registered nurses whose status for employment in nursing was unknown.

[2] Population data were based on provisional estimates of resident population as of July 1, 1980 in the publication of U.S. Department of Commerce, Bureau of the Census, Provisional Estimates of the Population of States, July 1, 1981. Series P-25, No. 911 Issued April 1982.

SOURCE: U.S Department of Health and Human Services, Office of Data Analysis and Management. The Registered Nurse Population: An Overview. From National Sample of Registered Nurses, November 1980. DHHS Pub. No. HRS-P-OD-83-1. U.S. Government Printing Office, Washington, D.C., January 1983.

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Table 10-9. ESTIMATED SUPPLY OF REGISTERED NURSES BY
EDUCATIONAL PREPARATION AND GEOGRAPHIC AREA,
DECEMBER 31, 1983

Geographic area	1983				
	Total RN's [1]	AD& dip.	Bacc.	Masters & doct.	RN's per 100,000 pop. [2]
United States	1,404,200	977,180	347,100	79,940	600
New England	118,400	82,450	27,860	8,150	948
Connecticut	28,200	19,950	6,190	2,080	899
Maine	8,700	6,820	1,670	240	759
Massachusetts	60,000	41,080	14,300	4,660	1,040
New Hampshire	8,800	6,200	2,300	260	918
Rhode Island	8,000	4,960	2,260	760	838
Vermont	4,700	3,440	1,140	150	895
Middle Atlantic	264,000	185,540	64,560	14,010	713
New Jersey	51,600	36,010	13,020	2,620	691
New York	121,800	81,130	32,950	7,770	689
Pennsylvania	90,600	68,400	18,590	3,620	762
South Atlantic	209,000	150,250	46,970	11,880	539
Delaware	4,800	3,400	1,220	150	792
District of Columbia	8,100	4,560	2,610	920	1,300
Florida	58,600	45,350	11,220	2,070	549
Georgia	24,600	16,520	5,300	2,810	429
Maryland	29,700	20,380	6,990	2,330	690
North Carolina	29,400	20,910	7,310	1,210	483
South Carolina	14,100	10,540	2,990	580	432
Virginia	29,300	20,280	7,530	1,530	528
West Virginia	10,400	8,310	1,800	280	529
East South Central	72,800	52,430	16,110	4,250	487
Alabama	18,600	11,690	5,750	1,160	470
Kentucky	19,900	15,300	3,570	1,020	536
Mississippi	11,100	8,280	2,160	650	429
Tennessee	23,200	17,160	4,630	1,420	495
West South Central	97,900	61,870	29,940	6,100	380
Arkansas	9,000	6,880	1,710	370	387
Louisiana	16,000	10,590	4,870	550	361
Oklahoma	11,800	7,830	3,630	390	358
Texas	61,100	36,570	19,730	4,790	389
East North Central	259,900	184,680	61,630	13,480	626
Illinois	70,300	48,180	17,780	4,300	612
Indiana	31,600	22,150	7,890	1,530	577
Michigan	53,500	38,210	12,010	3,290	590
Ohio	71,700	55,010	13,930	2,760	667
Wisconsin	32,800	21,130	10,020	1,600	690
West North Central	122,400	89,050	28,180	5,240	703
Iowa	21,600	16,780	4,150	690	774
Kansas	16,100	11,270	4,060	770	664
Minnesota	35,000	25,180	7,850	1,980	845
Missouri	28,600	20,480	7,000	1,120	576
Nebraska	11,200	8,220	2,430	560	701
North Dakota	4,800	3,550	1,210	40	706
South Dakota	5,100	3,570	1,480	80	729
Mountain	69,500	45,840	19,600	3,940	564
Arizona	18,400	12,530	4,750	1,170	621
Colorado	20,400	12,510	6,460	1,380	850
Idaho	5,000	3,870	1,010	80	506
Montana	4,200	2,890	1,120	180	514
Nevada	4,500	3,080	1,260	140	505
New Mexico	7,100	4,730	1,940	420	508
Utah	7,300	4,400	2,360	490	451
Wyoming	2,600	1,830	700	80	311
Pacific	190,100	125,070	52,190	12,860	565
Alaska	2,300	1,400	810	90	480
California	136,100	90,750	36,130	9,240	541
Hawaii	6,000	3,750	1,960	280	587
Oregon	19,500	13,280	5,100	1,110	733
Washington	26,200	15,890	8,190	2,140	609

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[1] Estimated number may not add to total due to rounding.

[2] Population data used for computation of nurse - population ratios are based on resident population as of July 1, 1983 from the Bureau of the Census, U.S. Department of Commerce as reported in Population Estimates and Projections, Series P-25 No. 951, May 1984.

SOURCE: Estimates prepared by Division of Nursing, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services, 1984.

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Table 10-10. DISTRIBUTION OF THE REGISTERED NURSE SUPPLY, BY PRINCIPAL EMPLOYMENT SETTING AND NURSING-RELATED EDUCATIONAL PREPARATION, NOVEMBER 1980

Principal employment setting	Total		Associate degree		Diploma		Bacc.		Master's		Doctoral	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Total employed	[1]1,272,851	100.0	256,167	20.1	645,494	50.7	296,202	23.3	65,224	5.1	[2]2,967	.2
Hospital	835,646	100.0	199,035	23.8	407,166	48.7	200,879	24.0	24,403	2.9	312	(3)
Nsg. home or extended care facility	101,209	100.0	16,923	16.7	71,182	70.3	11,483	11.3	1,163	1.2	-	-
Public/commun. health	83,440	100.0	12,001	14.4	35,191	42.2	28,498	34.2	7,568	9.1	27	(3)
Physician's or dentist's ofc.	71,973	100.0	10,294	14.3	50,031	69.5	9,528	13.2	1,589	2.2	93	.1
Student health service	44,907	100.0	2,903	6.5	20,763	46.2	16,477	36.7	4,299	9.6	-	-
Nursing educ.	46,504	100.0	2,122	4.6	8,361	18.0	12,228	26.3	21,396	46.0	1,948	4.2
Occupational hlth.	29,164	100.0	3,510	12.0	20,574	70.6	4,036	13.8	725	2.5	130	.4
Private duty nsg.	20,239	100.0	2,698	13.3	14,178	70.0	2,639	13.0	512	2.5	-	-
Other self-emp.	10,853	100.0	1,777	16.4	4,391	40.5	2,960	27.3	1,707	15.7	-	-
Other	21,666	100.0	3,295	15.2	10,706	49.4	5,498	25.4	1,492	6.9	434	2.0
Not known	7,249	100.0	1,611	22.2	2,951	40.7	1,977	27.3	369	5.1	24	.3

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[1] Includes an estimated 6,797 registered nurses for whom highest educational preparation is not known.

[2] Because of the small number of sample cases in most of the categories in this column, these numbers are subject to wide sampling variation.

[3] Less than .1 percent.

SOURCE: Bentley, et al., National Sample Survey of Registered Nurses II, Status of Nurses: November 1980, NTIS, Stock No. HRP 0904375; and unpublished data.

Table 10-11. FIELD OF EMPLOYMENT AND TYPE OF POSITION OF EMPLOYED LICENSED PRACTICAL/VOCATIONAL NURSES: NOVEMBER 1983

Field of employment	Total 1	Charge nurse	Private duty nurse	Staff nurse	No position title	Other	Not known
Total licensed practical nurses employed in nursing	539,463	103,425	22,797	351,697	48,928	4,170	8,447
Hospital	310,842	15,863	1,597	274,520	18,061	454	349
Nursing home	121,398	78,315	1,210	36,138	3,787	1,694	254
Public/community health	13,574	2,022	834	7,706	2,219	779	13
Student health	4,200	215	-	2,516	806	585	78
Occupational health	6,056	874	312	2,941	1,826	102	-
Physicians or dentists office	48,969	5,043	45	23,829	19,636	294	122
Private duty	19,959	260	18,175	703	745	61	13
Other	6,237	721	501	3,074	1,740	201	-
Not known	8,229	112	122	271	107	-	7,617

1 Individual items may not add to totals because of rounding.

SOURCE: U.S. Department of Health and Human Services, Division of Nursing, First National Sample Survey of Licensed Practical and Vocational Nurses, 1983, Accession No. HRP0906278, National Technical Information Service, Springfield, VA 1984.

Table 10-12. EMPLOYMENT AND VACANCY RATES OF NURSING PERSONNEL IN U.S. REGISTERED HOSPITALS AND IN COMMUNITY HOSPITALS BY TYPE OF PERSONNEL, 1981, 1982 AND 1983

Personnel classification	U.S. registered hospitals			Community hospitals		
	1981	1982	1983	1981	1982	1983
Total hospital personnel	4,124,974	4,250,421	4,215,014	3,470,567	3,585,290	3,579,711
Full time	3,197,902	3,295,286	3,258,474	2,596,609	2,686,998	2,680,550
Part time	927,072	955,135	956,540	873,958	898,292	899,161
FTE [1]	3,661,438	3,772,853	3,736,744	3,033,588	3,136,144	3,130,130
Vacancy rate	4.4	3.3	3.1	4.2	3.2	3.0
Registered nurses	823,321	881,791	913,945	751,301	804,709	836,504
Full time	571,790	606,852	627,748	507,407	539,130	559,800
Part time	251,531	274,939	286,197	243,894	265,580	276,704
FTE	697,555	744,321	770,846	629,354	671,918	698,151
Vacancy rate	7.6	5.3	4.4	7.6	5.3	4.4
Licensed practical/ vocational nurses	304,606	311,338	302,331	274,722	280,658	271,912
Full time	221,712	223,682	215,881	193,730	195,016	187,558
Part time	82,894	87,656	86,450	80,992	85,642	84,354
FTE	263,159	267,510	259,106	234,226	237,837	229,735
Vacancy rate	5.8	3.7	3.1	5.5	3.4	2.8
Ancillary personnel	428,671	437,607	451,128	324,802	332,138	341,364
Full time	336,207	339,865	351,446	236,426	238,891	246,907
Part time	92,464	97,742	99,683	88,376	93,247	94,367
FTE	382,439	388,736	401,287	280,614	285,514	294,180
Vacancy rate	3.0	2.6	2.6	2.9	2.4	2.3

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[1] FTE = Full-time equivalent.

SOURCE: American Hospital Association, Annual Surveys of Hospitals, 1981, 1982, 1983.

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Table 10-13. TOTAL AND FULL TIME EQUIVALENT EMPLOYMENT AND VACANCY RATES OF NURSING PERSONNEL IN COMMUNITY HOSPITALS, BY GEOGRAPHIC AREA, 1983

Geographic area	Registered nurses			LPNs/LVNs			Ancillary personnel		
	Total employment	FTE employment	Vacancy rate	Total employment	FTE employment	Vacancy rate	Total employment	FTE employment	Vacancy rate
United States	836,504	698,151	4.5	271,912	229,735	2.8	341,364	294,180	2.3
New England	57,191	44,127	4.7	14,923	11,083	3.3	15,772	12,508	3.8
Connecticut	11,740	9,190	4.1	2,836	2,149	3.2	3,522	2,827	1.7
Maine	4,564	3,543	3.6	1,678	1,265	2.3	1,547	1,198	2.0
Massachusetts	30,674	24,049	5.2	7,221	5,371	3.7	8,220	6,621	5.0
New Hampshire	3,695	2,914	3.7	993	763	2.1	870	706	3.3
Rhode Island	4,037	3,025	5.1	1,282	935	4.3	1,002	769	5.4
Vermont	2,481	1,402	3.7	913	619	2.5	611	387	2.0
Middle Atlantic	150,187	128,734	4.5	39,452	33,765	2.5	54,945	48,762	2.2
New Jersey	25,217	20,895	5.3	7,571	6,403	2.5	9,167	7,813	1.5
New York	71,884	62,715	4.5	16,791	14,463	2.9	28,585	25,898	2.4
Pennsylvania	53,086	45,123	4.3	15,090	12,899	2.0	17,193	15,050	2.1
East North Central	166,446	136,584	4.1	51,723	41,594	2.6	71,618	59,362	2.0
Illinois	48,665	40,756	3.7	10,780	9,095	1.7	20,039	17,166	1.9
Indiana	20,125	16,484	4.7	5,761	4,638	3.5	10,940	9,023	1.7
Michigan	34,520	28,340	4.9	13,776	10,915	3.0	14,866	12,296	2.3
Ohio	44,809	37,013	4.0	15,981	13,091	2.9	17,411	14,647	2.3
Wisconsin	18,327	13,989	3.2	8,362	3,854	1.7	8,362	6,228	1.8
West North Central	71,730	56,431	3.0	23,482	18,561	2.0	29,512	23,736	1.9
Iowa	12,148	9,759	2.9	3,198	2,467	3.3	4,344	3,462	3.1
Kansas	8,861	7,164	3.3	2,824	2,299	1.5	5,234	4,324	1.2
Minnesota	18,052	12,828	3.2	5,800	4,112	1.6	5,296	4,006	1.5
Missouri	19,436	16,405	2.7	6,930	6,008	2.1	9,254	7,862	2.2
Nebraska	7,248	5,660	3.0	2,339	1,062	1.8	2,709	983	1.0
North Dakota	3,357	2,530	4.5	1,427	1,844	1.5	1,364	2,096	2.5
South Dakota	2,628	2,081	1.3	964	767	1.3	1,311	1,000	0.0
South Atlantic	128,822	111,559	5.4	44,723	39,684	3.8	60,209	53,554	2.6
Delaware	2,061	1,752	4.4	586	507	2.9	673	591	1.8
District of Columbia	4,882	4,446	6.3	971	894	4.6	1,528	1,367	2.7
Florida	38,183	33,666	4.6	13,311	11,700	3.0	16,432	14,853	3.1
Georgia	17,398	14,889	5.8	7,566	6,832	2.2	10,968	9,739	2.3
Maryland	16,719	13,359	5.9	2,887	2,413	3.3	6,559	5,480	2.9
North Carolina	18,608	16,838	7.7	6,020	5,432	10.2	8,253	7,450	3.6
South Carolina	7,561	6,694	4.4	3,788	3,409	2.0	5,413	4,861	1.2
Virginia	16,915	14,187	5.2	6,554	5,744	3.4	6,173	5,325	2.5
West Virginia	6,495	5,738	1.9	3,040	2,751	0.3	4,210	3,886	0.8
East South Central	44,139	39,573	5.4	22,504	20,664	2.1	29,328	26,405	1.6
Alabama	12,567	11,496	5.1	6,837	6,379	2.5	6,346	5,663	1.6
Kentucky	11,066	9,583	4.8	3,873	3,459	1.5	6,573	5,734	1.8
Mississippi	6,095	5,533	6.4	4,182	3,855	1.9	5,162	4,762	2.0
Tennessee	14,411	12,953	5.6	7,612	6,971	2.2	11,247	10,246	1.3
West South Central	67,718	60,077	5.4	36,430	32,826	3.0	38,986	35,397	2.5
Arkansas	5,844	5,213	6.5	4,769	4,286	2.1	3,931	3,446	2.2
Louisiana	11,118	9,832	5.4	5,858	5,241	2.1	9,477	8,684	2.0
Oklahoma	7,938	6,940	4.5	4,257	3,819	3.4	5,302	4,871	2.8
Texas	42,818	38,073	5.4	21,546	19,479	3.3	20,276	18,395	2.8
Mountain	37,485	30,790	3.9	10,361	8,456	2.8	11,338	9,609	1.7
Arizona	10,055	8,244	4.8	2,305	1,898	5.5	3,901	3,377	2.9
Colorado	10,857	8,660	4.0	2,224	1,758	1.8	2,619	2,208	1.8
Idaho	2,552	2,037	2.7	1,252	990	1.0	646	496	0.4
Montana	2,242	2,242	2.9	659	659	1.3	-	-	-
Nevada	2,460	2,185	3.7	845	742	2.5	982	888	1.0
New Mexico	3,357	2,798	3.8	1,284	1,042	4.1	1,310	1,164	0.9
Utah	4,646	3,546	2.8	1,387	425	1.4	1,251	467	0.8
Wyoming	1,316	1,076	5.0	405	335	1.8	629	528	0.8
Pacific	113,375	90,271	4.5	28,401	23,098	2.7	29,776	24,846	2.4
Alaska	1,338	1,016	1.5	253	176	2.2	276	238	0.4
California	85,756	68,941	4.7	21,495	17,723	2.8	23,588	19,805	2.6
Hawaii	2,254	1,989	2.7	733	667	1.8	804	737	3.0
Oregon	10,350	7,716	3.2	2,077	1,569	2.2	2,166	1,720	1.1
Washington	13,677	10,607	4.4	3,843	2,962	2.9	2,942	2,345	2.1

SOURCE: American Hospital Association, Annual Survey of Hospitals, 1983.

Table 10-14. NUMBER OF FULL TIME EQUIVALENT[1] REGISTERED NURSES, LICENSED PRACTICAL/VOCATIONAL NURSES, AND NURSING AIDES PER 100 RESIDENTS IN NURSING HOMES, BY GEOGRAPHIC AREA, 1982

Geographic area	Total nursing personnel	RNs	LP/VNs	Nursing aides
United States	40.4	4.6	6.2	29.6
New England	37.1	6.1	4.9	26.1
Connecticut	24.9	6.0	3.5	15.4
Maine	35.3	4.1	3.6	27.6
Massachusetts	41.3	6.1	5.7	29.4
New Hampshire	44.7	9.5	6.1	29.1
Rhode Island	49.6	7.2	5.5	36.9
Vermont	33.3	5.4	5.1	22.7
Middle Atlantic	44.2	7.0	6.4	30.8
New Jersey	41.0	6.7	5.0	29.3
New York	41.8	6.6	6.5	28.7
Pennsylvania	50.1	7.7	7.1	35.3
South Atlantic	39.4	4.3	6.4	28.7
Delaware	36.8	7.5	6.2	23.1
District of Columbia	46.8	6.5	7.9	32.4
Florida	39.2	4.8	6.0	28.4
Georgia	37.3	2.5	7.6	27.2
Maryland	43.4	5.5	6.0	31.9
North Carolina	35.6	3.9	5.4	26.3
South Carolina	46.1	5.1	8.2	32.8
Virginia	38.8	4.2	6.0	28.6
West Virginia	43.4	4.1	7.0	32.1
East South Central	43.7	2.7	7.8	33.2
Alabama	46.6	2.6	9.5	34.5
Kentucky	38.8	2.6	4.8	31.4
Mississippi	48.1	3.7	9.7	34.7
Tennessee	43.9	2.5	8.4	33.0
West South Central	35.5	1.6	7.9	26.0
Arkansas	34.6	2.1	9.2	23.3
Louisiana	35.2	1.7	7.9	25.6
Oklahoma	28.5	1.5	4.8	22.2
Texas	37.8	1.4	8.5	27.9
East North Central	40.3	4.5	5.7	30.1
Illinois	34.2	4.3	4.9	25.1
Indiana	37.1	3.5	4.2	29.4
Michigan	43.9	4.0	5.5	34.4
Ohio	46.6	5.3	7.6	33.7
Wisconsin	41.6	5.2	5.7	30.7
West North Central	37.9	3.6	4.8	29.5
Iowa	32.2	3.5	5.8	22.9
Kansas	42.3	2.6	3.6	36.1
Minnesota	41.9	5.4	5.7	30.8
Missouri	38.3	2.5	4.1	31.7
Nebraska	35.7	3.1	3.9	28.8
North Dakota	35.1	5.1	5.1	24.9
South Dakota	33.1	3.1	3.6	26.4
Mountain	42.2	6.2	6.4	29.5
Arizona	42.9	6.6	5.3	30.9
Colorado	40.8	6.8	6.0	28.0
Idaho	48.7	6.2	7.4	35.0
Montana	40.5	6.1	6.7	27.7
Nevada	46.0	8.4	6.7	30.9
New Mexico	38.3	3.8	6.6	27.9
Utah	42.6	3.9	8.1	30.5
Wyoming	39.1	6.1	6.5	26.5
Pacific	44.1	5.7	6.6	31.8
Alaska	34.6	8.2	2.3	24.1
California	47.1	5.5	7.5	34.1
Hawaii	37.0	5.4	4.6	27.0
Oregon	39.7	5.7	4.2	29.8
Washington	37.2	6.6	5.1	25.5

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[1] Full-time equivalents include all full-time personnel plus one/half of part-time personnel.

SOURCE: Derived from data in U.S. Department of Health and Human Services, National Center for Health Statistics, 1982 Master Facility Inventory, unpublished.

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Table 10-15. AVERAGE ANNUAL EARNINGS OF REGISTERED NURSES EMPLOYED FULL TIME IN THEIR PRINCIPAL NURSING POSITION, BY FIELD OF EMPLOYMENT AND TYPE OF POSITION: NOVEMBER 1980

Field of employment	Total[1]	Adm. or assist.	Consult.	Supvr. or assist.	Instru.	Nurse pract./ midwife	Clin. nurse spec.	Nurse clin.	Head Nurse or asst.	Gen. duty staff	Nurse anest.
Total	$17,398	$21,426	$19,990	$18,773	$18,804	$19,292	$18,708	$19,276	$18,385	$16,066	$28,783
Hospital	17,802	24,486	(2)	19,806	19,367	20,448	19,419	19,739	18,758	16,521	25,574
Nursing home	15,617	17,321	(2)	15,304	(2)	(2)	(2)	-	15,030	13,921	-
Nursing educ.	19,257	25,102	-	(2)	18,739	(2)	(2)	(2)	(2)	(2)	(2)
Public health/ commun. health	16,750	20,748	19,741	17,918	(2)	17,612	(2)	(2)	17,518	15,186	(2)
Student health service	15,061	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	14,590	-
Occupational health	18,749	(2)	(2)	(2)	(2)	(2)	(2)	(2)	18,681	18,648	(2)
Physician's or dentist's ofc.	13,286	(2)	(2)	15,446	(2)	19,068	14,166	(2)	13,925	12,048	(2)

[1] Includes all registered nurses in positions not separately identified, as well as those itemized separately.

[2] Too few to compute average.

SOURCE: U.S. Department of Health and Human Services, Office of Data Analysis and Management. The Registered Nurse Population: An Overview. From National Sample of Registered Nurses, November 1980. DHHS Pub. No. HRP-P-OD-83-1. U.S. Government Printing Office, Washington, D.C., January 1983.

Table 10-16. AVERAGE ANNUAL EARNINGS OF LICENSED PRACTICAL/VOCATIONAL NURSES EMPLOYED FULL TIME IN THEIR PRINCIPAL NURSING POSITION, BY FIELD OF EMPLOYMENT AND TYPE OF POSITION: NOVEMBER 1983

Field of employment	Total 1	Charge nurse	Private duty nurse	Staff nurse	No position title
Total	$14,395	$13,938	$11,934	$14,714	$13,914
Hospital	$15,106	$15,415	2	$15,083	$15,256
Nursing home	$13,463	$13,498	2	$13,449	$13,044
Public/community health	$13,730	$14,537	2	$13,907	$13,319
Student health	$11,053	2	2	$10,887	2
Occupational health	$15,472	2	2	$15,201	$15,326
Physician or dentist offices	$13,068	$14,743	2	$12,801	$12,853
Private duty	$11,845	2	$11,744	2	2

1 Includes all licensed practical/vocational nurses in positions not separately identified, as well as those itemized separately.

2 Too few to compute average.

SOURCE: U.S. Department of Health and Human Services, Division of Nursing. First National Sample Survey of Licensed Practical and Vocational Nurses, 1983. Accession No. HRP0906278, National Technical Information Service, Springfield, VA, 1984.

Table 10-17. PROJECTED NUMBER OF GRADUATES FROM PRACTICAL NURSING EDUCATIONAL PROGRAMS, ACADEMIC YEARS 1983-84 THROUGH 1999-2000

Academic year	Total
1983-84	43,800
1984-85	42,700
1985-86	40,000
1986-87	39,600
1987-88	39,600
1988-89	39,400
1989-90	39,200
1990-91	39,000
1991-92	38,600
1992-93	38,100
1993-94	37,600
1994-95	37,200
1995-96	36,800
1996-97	36,500
1997-98	36,100
1998-99	35,800
1999-2000	35,500

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-18. PROJECTIONS OF NATIONAL SUPPLY OF LICENSED PRACTICAL/VOCATIONAL NURSES, 1983-2000

As of December 31	Total number of nurses	Total nurses per 100,000 pop.[1]	Full-time equivalents (FTE)	FTE per 100,000 pop.[1]
1983	539,500	231	471,100	200
1984	561,000	237	490,300	207
1985	582,800	243	509,700	213
1986	606,400	251	530,600	219
1987	628,400	257	550,200	225
1988	656,500	267	575,100	234
1989	675,700	272	592,200	239
1990	693,500	277	608,000	242
1991	710,700	282	623,400	247
1992	727,600	286	638,400	251
1993	751,800	293	659,900	258
1994	768,600	298	674,900	261
1995	783,900	302	688,500	265
1996	798,800	305	701,800	268
1997	813,200	309	714,800	272
1998	833,100	315	732,400	277
1999	846,700	318	744,600	279
2000	859,200	320	755,800	282

[1] Population data used for computation of nurse-population ratios are developed by the Division of Nursing based on projections from the Bureau of the Census, U.S. Department of Commerce, as reported in *Illustrative Projections of State Populations by Age, Race, and Sex: 1975-2000*, Series P-25, No. 796, March 1979, and *Projections of the Population of the United States by Age, Sex, and Race: 1983 to 2080*, Series P-25, No. 952, May 1984.

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, Department of Health and Human Services, 1985.

Table 10-19. PROJECTED SUPPLY OF LICENSED PRACTICAL/VOCATIONAL NURSES BY GEOGRAPHIC AREA, DECEMBER 31, 1990 AND 2000

Geographic area	1990		2000	
	Total LP/VN's [1]	LP/VN's per 100,000 pop. [2]	Total LP/VN's [1]	LP/VN's per 100,000 pop. [2]
United States	693,530	277	859,160	320
New England	42,330	332	51,070	400
Connecticut	9,030	289	10,720	351
Maine	4,500	384	5,870	466
Massachusetts	17,160	301	17,080	312
New Hampshire	5,680	494	9,800	712
Rhode Island	3,280	345	3,820	412
Vermont	2,680	465	3,780	603
Middle Atlantic	92,080	259	99,520	297
New Jersey	17,520	233	20,900	281
New York	37,170	227	34,860	234
Pennsylvania	37,390	320	43,750	392
South Atlantic	136,950	315	193,630	393
Delaware	1,400	225	1,630	255
District of Columbia	1,020	208	870	234
Florida	42,820	316	62,370	353
Georgia	21,110	340	27,050	402
Maryland	8,370	186	9,660	211
North Carolina	25,330	390	41,380	601
South Carolina	12,700	355	18,340	467
Virginia	18,140	303	24,850	387
West Virginia	6,050	297	7,470	361
East South Central	50,615	313	64,370	373
Alabama	19,400	459	29,450	665
Kentucky	9,430	231	12,160	275
Mississippi	10,230	370	12,620	427
Tennessee	11,550	227	10,140	186
West South Central	93,110	326	119,720	364
Arkansas	8,850	342	11,290	396
Louisiana	13,380	281	17,170	331
Oklahoma	9,720	275	12,510	315
Texas	61,170	346	78,750	377
East North Central	106,210	251	116,840	281
Illinois	24,480	213	30,000	265
Indiana	13,110	231	15,410	272
Michigan	26,280	280	28,350	310
Ohio	31,400	291	32,900	319
Wisconsin	10,950	217	10,230	196
West North Central	62,030	347	75,050	416
Iowa	5,850	230	6,220	209
Kansas	7,120	289	8,240	330
Minnesota	18,530	425	23,800	533
Missouri	16,740	330	20,580	406
Nebraska	7,120	434	9,550	573
North Dakota	3,070	453	3,310	484
South Dakota	2,610	374	3,390	487
Mountain	34,000	217	45,850	225
Arizona	7,530	185	9,710	171
Colorado	8,560	225	11,050	235
Idaho	2,930	238	3,610	236
Montana	4,520	508	7,600	784
Nevada	1,020	78	1,210	62
New Mexico	5,460	353	7,680	441
Utah	3,060	147	3,820	135
Wyoming	920	129	1,200	117
Pacific	76,210	207	93,100	218
Alaska	1,250	237	1,640	257
California	56,000	202	68,210	217
Hawaii	2,140	187	2,670	208
Oregon	5,510	164	6,620	163
Washington	11,300	223	13,970	238

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[1] Figures may not add to totals because of rounding.

[2] Population data used for computation of nurse-population ratios are developed by the Division of Nursing based on projections from the Bureau of the Census, U.S. Department of Commerce as reported in Illustrative Projections of State Populations by Age, Race and Sex: 1975-2000, Series P-25, No. 796, March 1979 and Projections of the Population of the United States by Age, Sex and Race: 1983-2080, Series P-25, No. 952, May 1984.

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, Department of Health and Human Services, 1985.

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Table 10-20. PROJECTED NUMBER OF GRADUATES FROM BASIC NURSING PROGRAMS PREPARING REGISTERED NURSES, BY TYPE OF PROGRAM, ACADEMIC YEARS 1983-84 THROUGH 1999-2000

Academic year	Total	Associate degree	Diploma	Baccalaureate
1983-84	82,200	43,800	13,800	24,600
1984-85	82,700	44,300	14,000	24,400
1985-86	78,700	45,000	11,600	22,100
1986-87	78,800	45,500	11,000	22,300
1987-88	77,800	45,900	10,500	21,400
1988-89	76,500	46,000	10,000	20,500
1989-90	75,300	46,100	9,400	19,800
1990-91	73,900	45,900	9,000	19,000
1991-92	72,500	45,700	8,500	18,300
1992-93	71,300	45,500	8,100	17,700
1993-94	70,400	45,300	7,800	17,300
1994-95	69,400	45,100	7,400	16,900
1995-96	68,700	45,100	7,100	16,500
1996-97	68,000	45,000	6,800	16,200
1997-98	67,300	44,900	6,600	15,800
1998-99	66,900	44,700	6,300	15,900
1999-2000	66,400	44,400	6,000	16,000

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-21. PROJECTIONS OF NATIONAL SUPPLY OF REGISTERED NURSES, 1980-2000

As of December 31	Total number of nurses					Full-time equivalencies				
	Total RNs	AD & dip.	Bacc.	Master's & doct.	RNs per 100,000 pop[1]	Total RNs	AD & dip.	Bacc.	Master's & doct.	RNs per 100,000 pop.[1]
1980	1,272,900	908,300	297,300	67,300	560	1,068,000	747,300	259,200	61,600	470
1981	1,315,500	930,000	313,900	71,600	574	1,102,900	764,400	273,000	65,500	481
1982	1,357,300	952,600	328,900	75,800	586	1,136,300	781,900	285,200	69,200	491
1983	1,404,200	977,200	347,100	79,900	600	1,174,200	801,300	300,000	72,900	502
1984	1,453,900	1,000,600	369,400	84,000	613	1,215,400	819,800	319,000	76,700	512
1985	1,504,300	1,025,200	391,300	87,900	628	1,257,400	839,500	337,700	80,200	524
1986	1,553,400	1,048,100	412,600	92,600	642	1,298,400	858,100	355,600	84,600	536
1987	1,600,700	1,072,500	430,400	97,800	655	1,338,100	878,300	370,200	89,500	548
1988	1,650,100	1,096,000	450,300	103,700	670	1,379,400	897,700	386,700	95,000	560
1989	1,695,200	1,118,900	466,800	109,500	683	1,417,400	916,400	400,600	100,400	571
1990	1,739,100	1,142,800	481,100	115,200	695	1,454,100	935,900	412,600	105,600	581
1991	1,779,000	1,162,100	495,800	121,100	705	1,487,900	951,900	425,000	111,000	589
1992	1,818,100	1,181,700	508,600	127,700	715	1,521,500	968,300	436,100	117,000	598
1993	1,857,300	1,199,600	523,500	134,200	725	1,555,300	983,400	448,900	123,000	607
1994	1,895,700	1,218,100	536,300	141,300	734	1,588,800	999,100	460,200	129,500	615
1995	1,932,100	1,237,600	546,200	148,300	743	1,620,300	1,015,200	469,200	135,900	623
1996	1,963,900	1,252,200	556,400	155,300	751	1,648,200	1,027,400	478,400	142,300	630
1997	1,994,300	1,265,700	565,400	163,200	758	1,675,100	1,038,600	486,800	149,700	636
1998	2,023,400	1,277,800	575,000	170,500	764	1,700,700	1,048,500	495,600	156,600	642
1999	2,052,100	1,290,200	583,500	178,400	770	1,726,400	1,058,800	503,800	163,800	648
2000	2,079,400	1,303,500	589,700	186,300	775	1,750,300	1,069,600	509,700	171,100	652

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[1] Population data used for computation of nurse-population ratios are based on projections from the Bureau of the Census, U.S. Department of Commerce as reported in Illustrative Projections of State Populations by Age, Race, and Sex: 1975-2000, Series P-25, No. 796, March 1979, and Projections of the Population of the United States by Age, Sex, and Race: 1983 to 2080. Series P-25, No. 952, May 1984.

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, Department of Health and Human Services, 1985.

Table 10-22. PROJECTED SUPPLY OF REGISTERED NURSES BY EDUCATIONAL PREPARATION AND GEOGRAPHIC AREA, DECEMBER 31, 1990 AND 2000

Geographic area	1990					2000				
	Total RNs[1]	AD & dip.	Bacc.	Master's & doct.	RNs per 100,000 pop.[2]	Total RNs[1]	AD & dip.	Bacc.	Master's & doct.	RNs per 100,000 pop.[2]
United States	1,739,100	1,142,800	481,100	115,200	695	2,079,400	1,303,500	589,700	186,300	775
New England	142,600	89,600	40,770	12,280	1,119	163,000	92,630	50,900	19,620	1,275
Connecticut	34,000	21,350	9,120	2,990	1,086	38,400	22,880	11,160	4,360	1,257
Maine	11,100	8,000	2,840	270	899	14,100	9,780	4,080	280	1,072
Massachusetts	69,300	42,800	19,100	7,400	1,216	75,000	40,260	22,100	12,650	1,368
New Hampshire	11,700	7,400	3,900	410	1,017	15,900	9,140	6,100	670	1,155
Rhode Island	10,000	5,220	3,750	1,000	1,053	11,600	5,670	4,620	1,350	1,252
Vermont	6,500	4,230	2,060	210	1,128	8,000	4,900	2,840	310	1,275
Middle Atlantic	295,000	193,210	83,410	18,320	829	313,400	184,840	100,220	28,440	936
New Jersey	64,500	43,470	17,710	3,290	858	76,600	49,100	22,600	5,000	1,031
New York	124,200	76,840	37,200	10,130	758	114,600	64,430	34,140	16,040	769
Pennsylvania	106,300	72,900	28,500	4,900	909	122,200	71,310	43,480	7,400	1,094
South Atlantic	270,000	185,480	66,850	17,650	621	333,500	223,550	81,060	28,810	676
Delaware	6,700	4,500	2,000	200	1,065	8,700	5,720	2,310	500	1,357
District of Columbia	9,500	5,670	2,610	1,180	1,931	10,300	6,610	1,890	1,770	2,759
Florida	83,200	62,030	18,260	2,920	615	115,200	83,640	26,750	4,790	652
Georgia	26,800	16,630	5,520	4,660	431	27,400	14,820	4,360	8,190	407
Maryland	41,100	27,560	10,480	3,080	913	51,500	34,690	12,170	4,620	1,123
North Carolina	34,100	22,650	9,650	1,830	525	38,200	25,180	9,910	3,140	554
South Carolina	17,900	12,420	4,420	1,050	500	21,300	14,000	5,750	1,550	542
Virginia	38,000	24,740	10,890	2,340	635	46,100	29,500	12,900	3,640	719
West Virginia	12,700	9,280	3,020	390	622	14,800	9,390	4,820	610	715
East South Central	95,600	63,480	25,900	6,220	591	122,200	74,100	37,710	10,780	709
Alabama	24,800	13,930	9,310	1,530	587	32,200	15,010	14,570	2,620	727
Kentucky	25,000	17,850	5,740	1,440	611	31,600	21,320	8,030	2,210	715
Mississippi	15,600	10,230	4,220	1,190	564	20,200	11,240	6,810	2,130	684
Tennessee	30,200	21,470	6,630	2,060	593	38,200	26,530	8,300	3,820	702
West South Central	127,300	75,150	42,340	9,890	445	156,500	88,190	51,400	16,960	475
Arkansas	10,000	7,460	1,850	720	386	11,700	8,200	2,050	1,350	410
Louisiana	19,500	12,130	6,330	1,060	409	23,000	13,450	7,740	1,860	444
Oklahoma	15,300	9,680	5,100	560	433	19,500	12,350	6,230	940	491
Texas	82,500	45,880	29,060	7,550	466	102,300	54,110	35,380	12,810	489
East North Central	322,900	216,600	86,000	19,960	761	386,600	247,740	105,490	33,380	931
Illinois	77,500	51,190	20,850	5,490	675	83,700	52,500	22,600	8,570	751
Indiana	44,600	28,500	13,360	2,740	785	57,700	34,800	17,790	5,100	1,017
Michigan	66,500	44,250	17,380	4,840	708	77,800	48,100	21,600	8,130	850
Ohio	91,000	66,390	20,340	4,290	844	112,700	79,440	26,100	7,180	1,094
Wisconsin	42,900	26,270	14,070	2,600	851	54,700	32,900	17,400	4,400	1,046
West North Central	145,600	100,210	38,110	7,180	814	166,800	111,890	44,150	11,740	924
Iowa	25,400	18,800	5,500	1,080	852	28,500	20,720	5,960	1,870	959
Kansas	20,000	13,140	5,800	1,040	812	23,400	15,060	6,800	1,540	938
Minnesota	41,500	28,900	9,600	2,930	952	48,100	33,100	10,180	4,770	1,073
Missouri	33,800	22,530	10,020	1,270	666	39,100	24,680	12,150	2,270	711
Nebraska	13,200	9,350	3,100	780	805	14,900	9,990	3,700	1,190	895
North Dakota	5,800	3,780	1,930	40	857	6,400	3,750	2,640	60	937
South Dakota	5,900	3,710	2,160	60	846	6,400	3,590	2,720	60	931
Mountain	92,300	58,660	28,010	5,680	590	122,400	60,640	35,840	9,250	599
Arizona	24,100	15,380	7,100	1,660	592	30,700	18,600	9,320	2,750	541
Colorado	26,800	15,940	8,510	2,360	705	33,300	19,610	9,590	4,080	708
Idaho	6,600	4,900	1,490	100	536	8,400	6,220	2,050	150	549
Montana	3,500	2,300	1,050	180	393	3,000	2,020	830	160	309
Nevada	6,200	4,260	1,770	120	475	9,100	6,310	2,630	190	465
New Mexico	11,900	7,690	3,720	490	770	18,000	11,620	5,830	590	1,036
Utah	9,800	5,780	3,410	660	471	14,700	9,200	4,330	1,190	521
Wyoming	3,400	2,320	960	110	475	5,200	3,800	1,260	140	509
Pacific	247,900	160,330	69,650	18,020	673	314,900	204,190	82,920	27,850	739
Alaska	3,100	1,780	1,210	160	587	3,900	2,250	1,400	220	612
California	178,200	117,180	47,900	13,150	642	227,200	150,280	56,740	20,190	738
Hawaii	8,900	5,170	3,350	340	776	11,800	6,620	4,610	590	916
Oregon	25,900	17,400	7,100	1,440	772	34,600	23,290	9,330	1,990	851
Washington	31,800	18,800	10,090	2,930	628	37,400	21,750	10,840	4,860	638

[1] Figures may not add to total because of rounding.

[2] Population data used for computation of nurse-population ratios are developed by the Division of Nursing based on projections from the Bureau of the Census, U.S. Department of Commerce, as reported in Illustrative Projections of State Populations by Age, Race, and Sex: 1975-2000, Series P-25, No. 796, March 1979, and Projections of the Population of the United States by Age, Sex, and Race: 1983-2080, Series P-25, No. 952, May 1984.

SOURCE: Projections by Division of Nursing, Health Resources and Services Administration, Department of Health and Human Services, 1985.

Table 10-23. PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES AND LICENSED PRACTICAL/VOCATIONAL NURSES FROM THE HISTORICAL TREND-BASED MODEL FOR 1980-2000

As of December 31	RNs	LP/VNs
1980	1,068,540	429,500
1981	1,104,750	445,360
1982	1,141,100	459,870
1983	1,174,160	471,010
1984	1,211,100	474,760
1985	1,248,380	480,000
1986	1,286,610	485,420
1987	1,321,910	489,510
1988	1,354,100	492,100
1989	1,384,700	509,510
1990	1,414,700	526,700
1991	1,440,800	545,370
1992	1,467,240	564,130
1993	1,493,440	582,930
1994	1,520,510	602,430
1995	1,544,900	619,790
1996	1,570,290	637,770
1997	1,598,140	657,810
1998	1,626,290	678,170
1999	1,654,650	698,770
2000	1,683,130	719,560

SOURCE: Projections by the Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-24. PROJECTED REQUIREMENTS OF FULL-TIME EQUIVALENT REGISTERED NURSES AND LICENSED PRACTICAL/VOCATIONAL NURSES FROM HISTORICAL TREND-BASED MODEL BY AREA OF PRACTICE AS OF DECEMBER 31, 1980-2000

Area of practice	1980	1985	1990	1995	2000
Total[1]					
RNs	1,068,540	1,248,380	1,414,100	1,544,900	1,683,130
LP/VNs	429,500	480,000	526,700	619,790	719,560
Hospital					
RNs	709,960	791,930	835,500	854,810	871,740
LP/VNs	259,730	259,240	229,920	238,130	245,580
Nursing home					
RNs	78,490	115,220	156,780	204,440	259,090
LP/VNs	90,520	124,260	175,580	234,940	301,180
Nursing education					
RNs	41,570	43,400	44,890	46,390	50,320
LP/VNs	-	-	-	-	-
Community health					
RNs	141,610	186,580	248,530	293,020	338,280
LP/VNs	15,030	20,990	28,200	34,100	39,870
Physician's office					
RNs	57,190	68,340	82,230	96,250	109,550
LP/VNs	37,820	51,960	69,960	89,310	109,010
Other					
RNs	39,720	42,930	46,190	50,000	54,150
LP/VNs	26,400	23,550	23,050	23,300	23,920

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[1] Figures may not add to total due to rounding.

SOURCE: Estimates by Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-25. HISTORICAL TREND-BASED MODEL PROJECTIONS FOR FULL TIME EQUIVALENT REGISTERED NURSE AND LICENSED PRACTICAL/VOCATIONAL NURSE REQUIREMENTS FOR 1990 AND 2000 BY GEOGRAPHIC AREA

	1990		2000	
Geographic area	RN	LP/VN	RN	LP/VN
United States [1]	1,414,100	526,700	1,683,130	719,560
New England	107,820	29,500	126,300	38,440
Connecticut	27,800	7,080	34,530	9,640
Maine	9,010	2,900	11,260	4,010
Massachusetts	48,320	13,180	50,610	15,130
New Hampshire	10,150	2,240	13,880	3,510
Rhode Island	7,360	2,420	9,510	3,890
Vermont	5,180	1,680	6,510	2,260
Middle Atlantic	235,440	72,660	259,110	96,390
New Jersey	48,140	12,000	54,810	14,350
New York	104,500	34,970	105,450	44,800
Pennsylvania	82,800	25,690	98,850	37,240
South Atlantic	232,580	90,440	292,430	127,320
Delaware	5,550	1,080	6,740	1,190
District of Columbia	6,170	1,050	6,460	1,100
Florida	73,620	26,200	102,840	39,380
Georgia	27,500	18,430	33,890	27,680
Maryland	32,940	7,030	38,660	8,480
North Carolina	29,780	13,270	33,800	19,700
South Carolina	15,950	6,830	20,540	9,040
Virginia	30,360	12,200	36,800	15,300
West Virginia	10,710	4,350	12,700	5,450
East South Central	87,070	45,440	109,230	63,900
Alabama	21,430	13,140	24,880	16,940
Kentucky	23,490	8,570	31,120	13,070
Mississippi	14,460	8,450	19,630	12,660
Tennessee	27,690	15,280	33,600	21,230
West South Central	109,750	74,910	138,580	108,830
Arkansas	11,280	7,800	14,980	10,610
Louisiana	16,870	10,900	20,110	13,800
Oklahoma	12,740	7,580	15,810	11,200
Texas	68,860	48,630	87,680	73,220
East North Central	256,510	89,200	292,530	114,990
Illinois	65,300	17,640	70,750	20,340
Indiana	34,380	11,030	40,320	14,550
Michigan	51,880	19,960	54,270	22,500
Ohio	73,870	30,670	91,070	45,400
Wisconsin	31,080	9,900	36,120	12,200
West North Central	115,870	43,020	133,270	55,920
Iowa	21,530	6,750	24,110	8,230
Kansas	15,550	5,200	18,190	6,900
Minnesota	29,740	11,150	33,320	14,010
Missouri	29,600	12,220	34,930	17,210
Nebraska	10,100	3,680	11,110	4,280
North Dakota	4,290	2,180	4,980	2,740
South Dakota	5,060	1,840	6,630	2,550
Mountain	80,030	22,230	111,130	32,720
Arizona	21,530	5,200	30,520	8,500
Colorado	21,670	4,710	27,730	5,380
Idaho	6,070	2,470	9,420	4,080
Montana	3,560	1,540	3,950	1,970
Nevada	6,400	1,350	9,980	2,030
New Mexico	9,270	3,310	12,900	5,050
Utah	8,420	2,740	12,100	4,240
Wyoming	3,110	910	4,530	1,470
Pacific	189,030	59,340	220,560	81,040
Alaska	2,400	570	3,120	790
California	130,740	44,780	145,610	60,620
Hawaii	7,600	2,120	10,620	3,370
Oregon	21,400	3,790	27,490	4,690
Washington	26,890	8,080	33,720	11,570

[1] Figures may not add to totals because of rounding.

SOURCE: Projections by the Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 1990 (FULL-TIME EQUIVALENT NURSING PERSONNEL)

Field of employment	Criteria for staffing						Criteria for RN educational preparation							
	Lower bound			Upper bound			Doct. Pct.		Master's Pct.		Bacc. Pct.		AD/DIP Pct.	
	RNs	LPNs	Aides	RNs	LPNs	Aides	L	U	L	U	L	U	L	U
	Per 100 patients			Per 100 patients										
Direct client care														
Inpatient services														
General units	67.4	9.6	19.3	85.2	5.3	16.0					40	50	60	50
Rehabilitation units	67.4	9.6	19.3	85.2	5.3	16.0					40	50	60	50
Newborn units	48.6	12.2	12.2	56.8	12.2	12.2					20	50	80	50
Critical care units	344.8	0.0	0.0	446.2	0.0	0.0					50	60	50	40
Extended care units	20	20	20	30	20	20					50	50	50	50
Long-term hospitals (psychiatric)	13.2	0.0	39.6	15.7	0.0	47.2			5		45		50	
Short-term hospitals (psychiatric)	73.6	0.0	18.3	89.2	0.0	22.3			10	15	55	70	35	15
Other hospitals services														
Operating room	1.67 RNs per 1,000 operations (10 RNs/0 LPNs/ 3.3 Aides)			2.44 RNs per 1,000 operations (10 RNs/0 LPNs/ 2.5 Aides)								40		60
Emergency room	0.47 RNs per 1,000 visits (10 RNs/0 LPNs/ 4.3 Aides)			0.83 RNs per 1,000 visits (10 RNs/0 LPNs/ 3.3 Aides)							50	60	50	40
Outpatient clinics	0.06 RNs per 1,000 visits (10 RNs/5 LPNs/ 5 Aides)			0.13 RNs per 1,000 visits (10 RNs/2.5 LPNs/ 4.2 Aides)					20		80			
Nursing homes	10.2	10.2	40.5	16.2	16.2	48.7			5		45		50	

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL,1990
(FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Physicians' Ambulatory Care Settings	4.0 RNs per 10 MDs with shared services (10 RNs/0 LPNs/0 Aides)	5.0 RNs per 10 MDs with shared services (10 RNs/0 LPNs/0 Aides)		25	25	50
Community health						
I. Home visits						
A. Home health care	25% of number of hospital discharges 17% for acute post hospital care x 11 RN visits/person/year 8% for other post hospital care x 5 RN visits/person/year x $\frac{\text{lower bound}}{7}$ or $\frac{\text{upper bound}}{5}$ visits/RN/day plus 2% of the population age 65-74 x 7 RN visits/person/year and 5% of the population age 75-84 x 12 RN visits/person/year and 10% of the population age 85 and over x 15 RN visits/person/year and 15% of the 3% of the population under 65 who are disabled x 7 RN visits/person/year x $\frac{\text{lower bound}}{7}$ or $\frac{\text{upper bound}}{5}$ visits/RN/day Lower bound staffing mix: 1 RN/0 LPN/4 Aides Upper bound staffing mix: 1 RNs/0 LPNs/6 Aides			25	60	15

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL, 1990
(FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
B. Health Promotion/Disease Prevention Visits for High Risk Groups	4 RN visits/person/year $\frac{\text{lower bound}}{7}$ or $\frac{\text{upper bound}}{5}$ visits/RN/day x each high risk-group finding: 1. Maternal child health a. No. of mothers without prenatal care b. No. of infant deaths 1 month - 1 year c. 15% of births: 10% to high-risk mothers 5% other infant followup d. 5% of developmental disabilities 2. Mental health: a. Abused population 5% of the reported abused population (including child, spouse, elderly) b. Alcoholism and substance abuse 1% of the reported cases c. Chronic mental illness 1% of diagnosed cases 3. Communicable disease: a. 5% of Active TB (reported cases) b. 1% of Hepatitis (reported cases) c. 5% of sexually transmitted dieases (reported cases)			25	75	

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 1990 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
	4. Chronic illness: 2% of population 17 years and older for general chronic illness (hypertension, diabetes, cancer, etc.)					
	5. Environmental 1% of total population					
II. Clinic visits						
A. Community primary care clinics	3 visit/hour/RN 8 hour day with attempt to estimate current number of clinic visits,			20	70	10
	or					
	25,000 FTE	35,000 FTE				
	Lower bound staffing mix: 10 RNs/1 LPN/2 Aides	Upper bound staffing mix: 10 RNs/1 LPN/3 Aides				
B. Community mental health clinics	6 visits per 8 hour day per RN			100		

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL, 1990
(FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

	Criteria for staffing		Criteria for RN educational preparation			
Field of employment	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
III. Occupational Health						
I. In Plant Services						
A. Industrial Settings				25	75	
1 RN per 300 employees in firms with up to 1000 employees						
1 RN per each additional 1000 employees						
B. Non-Industrial Settings						
1 RN per 750 employees						
1 RN for each additional 1000 employees						
IV. School Health						
1 RN per 750 (general school population Grades 1-12)				30	70	
1 RN per 225 (mainstreamed students)						
1 RN per 125 (severely handicapped students)						
V. Other Licensure and Regulation	10 RNs per State	10 RNs per State		10	90	
VI. Correctional Institutuion						
A. Adult	1 RN per 80 inmates			10	90	
B. Juvenile	1 RN per 60 inmates			15	85	
C. For primary care	1 RN per 70 inmates			100		
D. For infirmaries	1 RN per 20 patients			10	90	
VII. Adult Day Care Centers	1 RN to 50 clients	1 RN to 35 clients		100		
VIII. Congregate Living	1 RN to 100 clients	1 RN to 75 clients		100		
Clinical specialists	RNs Per 100 patients	RNs Per 100 patients				
Large teaching hospitals (more than 400 beds)	3.0	5.0		100		
Small (less than 100 beds), and all long-term hospitals	2.0	4.0		100		
All other short-term hospitals	2.0	4.0		100		
Nursing homes	1.0	1.0		100		
Hospital ambulatory care	1 per 20 DCC RNs	1 per 20 DCC RNs		100		
Community health	1 per 15 DCC RNs	1 per 10 DCC RNs		100		

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL, 1990
(FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Administrative positions						
Executive/principal nurse administrator						
Large teaching hospitals (more than 400 beds)	1 Director of Nursing per institution		15	75		
All other hospitals	1 Director of Nursing per institution		2	60	38	
All hospitals	1 Assistant or Associate per 200 beds			60	40	
Nursing homes	1 Director per nursing home			30	70	
Community health	2 Directors per agency		10	90		
Mid-level Nurse Administrators/Managers						
All hospitals	1 Head Nurse/Manager per 36 beds			25	75	
All hospitals	4 Supervisors/Coordinators for the first 100 beds plus 1 each additional 100 beds			50	50	
Nursing homes	2 per 100 beds			30	70	
Community health	1 per 25 DCC RNs			80	20	
Inservice instructors						
Hospitals more than 400 beds	6 per institution	10 per institution		50	50	
Hospitals 100-400	3 per institution	5 per institution		50	50	
Hospitals less than 100 beds	1 per institution	1 per institution		50	50	
Nursing homes	1 per institution	1 per institution		30	70	
Community health (staff development)	1 per 75 nursing personnel	1 per 50 nursing personnel	20	80		

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL,1990
(FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Researchers and consultants						
Hospitals	0.5 RN per teaching hospital		75	25		
Physicians' Ambulatory Care Setting	1 RN per 500 DCC RNs	1 RN per 400 DCC RNs	50	50		
Community health						
Researchers	1 RN per 200 DCC RNs	1 RN per 100 DCC RNs	100			
Nursing home	0.1 RN per 10 DCC RNs	0.3 RN pe 10 DCC RNs	50	50		
Supplementary institutionally-based personnel	0.75 per institution				50	50
School of nursing						
Administrators						
Doctorate, master's, bacc.	1 per school and 1 per program (first 200 students),					
Associate, diploma	and 1 per each additional 200 students		100			
LPN	1 per program		10	90		
Faculty						
Doctorate	1 RN per 6 students	1 RN per 4 students	100			
Master's	1 RN per 6 students	1 RN per 4 students	85	15		
Baccalaureate	1 RN per 8 students	1 RN per 6 students	30	70		
Associate	1 RN per 10 students	1 RN per 8 students	20	80		
Diploma	1 RN per 10 students	1 RN per 8 students	10	90		
LPN	1 RN per 10 students	1 RN per 8 students		50	50	

Table 10-26. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 1990 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Private duty	1 RN per 10,000 pop.	0.9 RNs per 10,000 pop.			20	80
Health related organizations	0.4 RNs per 10,000 pop.	0.5 RNs per 10,000 pop.	10	90		
Nurse practitioners:						
	Lower bound	Upper bound				
Hospital ambulatory care	20% of hosp. outpatient clinic RNs	20% of hosp. outpatient clinic RNs		100		
Physicians' Ambulatory Care Settings	15% of RNs in physicians ambulatory care setting	25% of RNs in physicians' ambulatory care setting		100		
Community health	20% of RNs in public health	20% of RNs in public health		100		
Correctional Institutions	100% of primary care	100% of primary care		100		
Nursing homes	5% of all DCC RNs in nursing homes	5% of all DCC RNs in nursing homes		100		

SOURCE: U.S. Department of Health and Human Services, Division of Nursing. The 1984 Evaluation and Update of the Staffing Criteria for the Criteria-Based Model, April 1985.

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL)

Field of employment	Criteria for staffing						Criteria for RN educational preparation							
	Lower bound			Upper bound			Doct. Pct.		Master's Pct.		Bacc. Pct.		AD/DIP Pct.	
	RNs	LPNs	Aides	RNs	LPNs	Aides	L	U	L	U	L	U	L	U
	Per 100 patients			Per 100 patients										
Direct client care														
Inpatient services														
General units	78.1	11.2	22.3	105.4	6.6	19.8					50	60	50	40
Rehabilitation units	78.1	11.2	22.3	105.4	6.6	19.8					50	60	50	40
Newborn units	48.6	12.2	12.2	56.8	12.2	12.2					30	50	70	50
Critical care units	344.8	0.0	0.0	486.8	0.0	0.0					60	65	40	35
Extended care units	20.0	20.0	20.0	30.0	20.0	20.0					50	50	50	50
Long-term hospitals (psychiatric)	13.2	0.0	39.5	15.7	0.0	47.2			5		45		50	
Short-term hospitals (psychiatric)	73.0	0.0	18.3	89.2	0.0	22.3			15	20	70	75	15	5
Other hospitals services														
Operating room	1.67 RNs per 1,000 operations (10 RNs/0 LPNs/ 3.3 Aides)			2.44 RNs per 1,000 operations (10 RNs/0 LPNs/ 2.5 Aides)								40		60
Emergency room	0.83 RNs per 1,000 visits (10 RNs/0 LPNs/ 3.3 Aides)			1.11 RNs per 1,000 visits (10 RNs/0 LPNs/ 2.5 Aides)							50	60	50	40
Outpatient clinics	0.07 RNs per 1,000 visits (10 RNs/1.6 LPNs/ 5 Aides)			0.14 RNs per 1,000 visits (10 RNs/0.8 LPNs/ 4.6 Aides)					20		80		0	
Nursing homes	23.6	11.8	35.5	30.4	15.2	45.6			10		45		45	

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Physicians' Ambulatory Care Settings	4.0 RNs per 10 MDs with shared services (10 RNs/0 LPNs/0 Aides)	5.0 RNs per 10 MDs with shared services (10 RNs/0 LPNs/0 Aides)		30	30	40
Community health						
I. Home visits						
A. Home health care	25% of number of hospital discharges 17% for acute post hospital care x 11 RN visits/person/year 8% for other post hospital care x 5 RN visits/person/year x $\underset{7}{\underline{\text{lower bound}}}$ or $\underset{5}{\underline{\text{upper bound}}}$ visits/RN/day plus 2% of the population age 65-74 x 7 RN visits/person/year and 5% of the population age 75-84 x 12 RN visits/person/year and 10% of the population age 85 and over x 15 RN visits/person/year and 15% of the 3% of the population under 65 who are disabled x 7 RN visits/person/year x $\underset{7}{\underline{\text{lower bound}}}$ or $\underset{5}{\underline{\text{upper bound}}}$ visits/RN/day Lower bound staffing mix: 1 RN/0 LPN/4 Aides Upper bound staffing mix: 1 RNs/0 LPNs/6 Aides			25	60	15

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL,2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) -- CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
B. Health Promotion/Disease Prevention Visits for High Risk Groups	4 RN visits/person/year $\frac{\text{lower bound}}{7}$ or $\frac{\text{upper bound}}{5}$ visits/RN/day x each high risk-group finding: 1. Maternal child health a. No. of mothers without prenatal care b. No. of infant deaths 1 month - 1 year c. 15% of births: 10% to high-risk mothers 5% other infant followup d. 5% of developmental disabilities 2. Mental Health a. Abused Population 5% of the reported abused population (including child, spouse, elderly) b. Alcoholism and substance abuse 1% of the reported cases c. Chronic Mental illness 1% of diagnosed cases 3. Communicable disease: a. 5% of Active TB (reported cases) b. 1% of Hepatitis (reported cases) c. 5% of sexually transmitted dieases (reported cases)			25	75	

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION
IN THE CRITERIA-BASED MODEL, 2000
(FULL-TIME EQUIVALENT NURSING PERSONNEL) -- CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
	4. Chronic illness: 2% of population 17 years and older for general chronic illness (hypertension, diabetes, cancer, etc.)					
	5. Environmental 1% of total population					
II. Clinic visits						
A. Community primary care clinics	3 visit/hour/RN 8 hour day with attempt to estimate current number of clinic visits, or			20	70	10
	25,000 FTE	35,000 FTE				
	Lower bound staffing mix: 10 RNs/1 LPN/2 Aides	Upper bound staffing mix: 10 RNs/1 LPN/3 Aides				
B. Community mental health clinics	6 visits per 8 hour day per RN			100		

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
III. Occupational Health						
I. In Plant Services						
A. Industrial Settings				25	75	
1 RN per 300 employees in firms with up to 1000 employees						
1 RN per each additional 1000 employees						
B. Non-Industrial Settings						
1 RN per 750 employees						
1 RN for each additional 1000 employees						
IV. School Health						
1 RN per 750 (general school population Grades 1-12)				30	70	
1 RN per 225 (mainstreamed students)						
1 RN per 125 (severely handicapped students)						
V. Other Licensure and Regulation	10 RNs per State	10 RNs per State		10	90	
VI. Correctional Institutuion						
a. Adult	1 RN per 80 inmates			10	90	
b. Juvenile	1 RN per 60 inmates			15	85	
c. For primary care	1 RN per 70 inmates			100		
d. For infirmaries	1 RN per 20 patients			10	90	
VII. Adult Day Care Centers	1 RN to 50 clients	1 RN to 35 clients		100		
VIII. Congregate Living	1 RN to 100 clients	1 RN to 75 clients		100		
Clinical specialists	RNs	RNs				
	Per 100 patients	Per 100 patients				
Large teaching hospitals (more than 400 beds)	3.0	5.0		100		
Small (less than 100 beds), and all long-term hospitals	2.0	4.0		100		
All other short-term hospitals	2.0	4.0		100		
Nursing homes	1.0	1.0		100		
Hospital ambulatory care	1 per 20 DCC RNs	1 per 20 DCC RNs		100		
Community health	1 per 15 DCC RNs	1 per 10 DCC RNs		100		

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL,2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Administrative positions						
Executive/principal nurse administrator						
Large teaching hospitals (more than 400 beds)	1 Director of Nursing per institution		40	60		
All other hospitals	1 Director of Nursing per institution		2	80	18	
All hospitals	1 Assistant or Associate per 200 beds			80	20	
Nursing homes	1 Director per nursing home			50	50	
Community health	2 Directors per agency		10	90		
Mid-level Nurse Administrators/Managers						
All hospitals	1 Head Nurse/Manager per 36 beds			50	50	
All hospitals	4 Supervisors/Coordinators for the first 100 beds plus 1 each additional 100 beds			75	25	
Nursing homes	2 per 100 beds			50	50	
Community health	1 per 25 DCC RNs			100		
Inservice instructors						
Hospitals more than 400 beds	6 per institution	10 per institution		100	0	
Hospitals 100-400	3 per institution	5 per institution		100	0	
Hospitals less than 100 beds	1 per institution	1 per institution		75	25	
Nursing homes	1 per institution	1 per institution		50	50	
Community health (staff development)	1 per 75 nursing personnel	1 per 50 nursing personnel	20	80		

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Researchers and consultants						
Hospitals	1 RN per teaching hospital		100	0	0	
Physicians' Ambulatory Care Setting	1 RN per 500 DCC RNs	1 RN per 400 DCC RNs	50	50		
Community health						
Researchers	1 RN per 200 DCC RNs	1 RN per 100 DCC RNs	100			
Nursing home	0.1 RN per 10 DCC RNs	0.3 RN pe 10 DCC RNs	75	25		
Supplementary institutionally-based personnel	0.75 per institution				50	50
School of nursing						
Administrators						
Doctorate, master's, bacc.	1 per school and 1 per program (first 200 students),					
Associate, diploma	and 1 per each additional 200 students		100			
LPN	1 per program		10	90		
Faculty						
Doctorate	1 RN per 6 students	1 RN per 4 students	100			
Master's	1 RN per 6 students	1 RN per 4 students	100	0		
Baccalaureate	1 RN per 8 students	1 RN per 6 students	50	50		
Associate	1 RN per 10 students	1 RN per 8 students	25	75		
Diploma	1 RN per 10 students	1 RN per 8 students	10	90		
LPN	1 RN per 10 students	1 RN per 8 students		60	40	

Table 10-27. CRITERIA FOR NURSE STAFFING AND RN EDUCATIONAL PREPARATION IN THE CRITERIA-BASED MODEL, 2000 (FULL-TIME EQUIVALENT NURSING PERSONNEL) — CONTINUED

Field of employment	Criteria for staffing		Criteria for RN educational preparation			
	Lower bound	Upper bound	Doct. Pct.	Master's Pct.	Bacc. Pct.	AD/DIP Pct.
Private duty	1 RN per 10,000 pop.	0.9 RNs per 10,000 pop.			20	80
Health related organizations	0.4 RNs per 10,000 pop.	0.5 RNs per 10,000 pop.	10	90		

Nurse practitioners:

	Lower bound	Upper bound	
Hospital ambulatory care	20% of hosp. outpatient clinic RNs	20% of hosp. outpatient clinic RNs	100
Physicians' Ambulatory Care Settings	15% of RNs in physicians ambulatory care setting	25% of RNs in physicians' ambulatory care setting	100
Community health	20% of RNs in public health	20% of RNs in public health	100
Correctional Institutions	100% of primary care	100% of primary care	100
Nursing homes	10% of all DCC RNs in nursing homes	10% of all DCC RNs in nursing homes	100

SOURCE: U.S. Department of Health and Human Services, Division of Nursing. The 1984 Evaluation and Update of the Staffing Criteria for the Criteria-Based Model, April 1985.

Table 10-28. PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT NURSING PERSONNEL ACCORDING TO CRITERIA-BASED MODEL, BY FIELD OF EMPLOYMENT, 1990 AND 2000

	Lower bound			Upper bound		
Field of employment	RNs	LP/VNs	Aides	RNs	LP/VNs	Aides
			1990			
Total[1]	1,732,700	320,700	1,398,000	2,222,000	437,800	1,836,900
Hospitals	815,300	78,000	220,900	1,057,700	53,000	220,000
Nursing homes	369,200	240,100	953,300	519,500	381,300	1,146,400
Nursing education	44,700	-	-	57,200	-	-
Community health	393,100	2,500	224,000	458,500	3,500	470,500
Physician's ambulatory care	75,300	-	-	94,100	-	-
Other	35,000	-	-	35,000	-	-
			2000			
Total[1]	2,328,000	422,700	1,493,100	2,958,000	493,600	2,039,800
Hospitals	896,700	81,600	241,400	1,208,100	54,000	241,800
Nursing homes	838,400	338,600	1,018,600	1,053,000	436,100	1,308,300
Nursing education	49,400	-	-	63,900	-	-
Community health	415,400	2,500	233,134	483,420	3,500	489,600
Physician's ambulatory care	89,700	-	-	112,200	-	-
Other	37,600	-	-	37,600	-	-

[1] Figures may not add to total because of rounding.

SOURCE: Projections by The Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, 1985.

Table 10-29. PROJECTED REQUIREMENTS FOR FULL TIME EQUIVALENT REGISTERED NURSES ACCORDING TO CRITERIA ESTABLISHED AS LOWER BOUND IN CRITERIA - BASED MODEL BY GEOGRAPHIC AREA AND EDUCATION PREPARATION, 1990 AND 2000

	1990					2000				
Geographic area	Total	AD/Dip.	Bacc.	Mast.	Doct.	Total	AD/Dip.	Bacc.	Mast.	Doct.
United States 1/	1,732,710	568,010	803,280	339,370	22,350	2,327,880	732,100	1,079,880	479,430	35,910
New England	102,860	33,950	47,630	19,940	1,370	134,990	43,540	61,700	27,640	2,120
Connecticut	26,650	8,650	12,460	5,230	310	36,550	11,920	16,640	7,470	520
Maine	9,720	3,000	4,600	1,980	140	13,920	4,300	6,400	2,990	230
Massachusetts	47,960	16,290	22,040	9,010	630	58,730	19,230	26,740	11,820	940
New Hampshire	6,970	2,180	3,280	1,440	80	10,250	3,120	4,810	2,200	130
Rhode Island	7,050	2,430	3,100	1,360	160	8,860	2,880	4,020	1,730	230
Vermont	4,510	1,400	2,150	920	50	6,680	2,090	3,090	1,430	70
Middle Atlantic	248,100	84,830	112,890	46,600	3,790	298,100	95,320	138,330	58,420	6,050
New Jersey	48,460	16,590	22,230	9,080	570	58,030	18,460	27,290	11,420	880
New York	120,920	41,380	54,990	22,660	1,890	146,980	47,920	67,930	28,310	2,810
Pennsylvania	78,720	26,860	35,670	14,860	1,330	93,090	28,940	43,110	18,690	2,360
South Atlantic	272,430	88,960	126,380	53,670	3,430	363,380	112,360	170,330	75,360	5,330
Delaware	4,450	1,510	1,980	850	100	4,980	1,520	2,320	980	160
District of Columbia	5,560	2,100	2,360	950	160	5,450	1,820	2,470	930	230
Florida	76,180	25,750	35,250	14,450	730	106,360	32,680	50,950	21,530	1,200
Georgia	42,600	13,430	20,090	8,610	480	58,380	18,220	27,070	12,320	760
Maryland	30,950	10,080	14,390	6,110	370	42,640	13,750	19,650	8,680	560
North Carolina	38,670	12,370	17,950	7,790	560	50,310	15,330	23,540	10,660	780
South Carolina	19,930	6,040	9,350	4,250	290	26,420	7,750	12,290	5,890	500
Virginia	38,950	12,460	18,080	7,860	550	50,150	15,480	23,430	10,730	870
West Virginia	15,140	5,220	6,930	2,800	190	18,330	5,810	8,610	3,640	270
East South Central	115,360	37,890	52,900	22,810	1,694	152,770	47,830	70,290	31,840	2,810
Alabama	30,450	9,780	13,850	6,220	600	38,630	11,840	17,630	8,170	990
Kentucky	26,980	8,770	12,530	5,350	314	38,090	11,980	17,670	7,930	510
Mississippi	19,200	6,230	8,830	3,870	280	26,280	8,190	12,060	5,550	480
Tennessee	38,730	13,110	17,690	7,430	500	49,770	15,820	22,930	10,190	830
West South Central	190,480	61,590	88,700	37,960	2,250	268,330	83,430	125,020	56,060	3,840
Arkansas	20,500	6,690	9,560	4,020	240	30,280	9,810	13,930	6,160	370
Louisiana	29,630	9,060	13,830	6,350	400	42,830	13,040	19,730	9,390	680
Oklahoma	23,740	7,570	11,060	4,790	310	31,400	9,550	14,580	6,800	480
Texas	116,610	38,270	54,250	22,800	1,300	163,820	51,030	76,780	33,710	2,310
East North Central	341,460	113,290	158,520	65,390	4,280	475,490	155,020	218,310	95,020	7,140
Illinois	101,500	34,480	46,950	18,940	1,130	134,180	44,380	61,570	26,350	1,880
Indiana	39,840	13,040	18,520	7,730	560	52,040	16,370	24,220	10,560	890
Michigan	67,930	22,170	31,690	13,220	850	93,030	29,980	42,920	18,730	1,400
Ohio	89,090	29,740	41,360	16,880	1,110	133,690	43,870	61,280	26,600	1,940
Wisconsin	43,100	13,860	20,000	8,620	630	62,550	20,420	28,320	12,780	1,030
West North Central	146,250	47,510	68,140	28,760	1,840	188,800	59,510	86,570	39,870	2,840
Iowa	24,270	7,720	11,310	4,870	360	30,270	9,330	13,900	6,470	570
Kansas	20,430	6,460	9,510	4,140	320	25,910	8,000	11,780	5,660	470
Minnesota	34,490	11,090	16,200	6,850	360	44,200	13,990	20,270	9,420	510
Missouri	39,420	13,710	18,150	7,130	440	50,540	16,280	23,660	9,900	690
Nebraska	16,540	5,210	7,810	3,340	180	23,730	7,670	10,680	5,080	310
North Dakota	5,580	1,730	2,560	1,190	90	6,710	2,010	3,000	1,560	150
South Dakota	5,520	1,590	2,600	1,240	90	7,440	2,230	3,280	1,780	140
Mountain	82,070	25,260	38,590	17,160	1,070	118,640	34,020	56,230	25,970	1,820
Arizona	20,070	6,410	9,370	4,040	260	30,830	9,100	14,800	6,500	430
Colorado	20,090	6,450	9,400	4,010	210	24,780	7,150	12,020	5,300	310
Idaho	6,450	1,790	3,110	1,470	80	10,210	2,890	4,780	2,380	170
Montana	6,140	1,830	2,920	1,320	70	8,300	2,480	3,800	1,910	110
Nevada	6,900	2,160	3,240	1,410	100	11,210	3,180	5,380	2,440	210
New Mexico	7,510	2,140	3,520	1,720	130	9,080	2,460	4,210	2,230	180
Utah	10,440	3,150	4,910	2,220	160	15,410	4,280	7,430	3,410	290
Wyoming	4,470	1,330	2,120	970	60	8,220	2,480	3,810	1,800	120
Pacific	233,700	74,730	109,530	47,020	2,430	327,380	101,070	153,100	69,250	3,960
Alaska	2,280	570	1,090	580	40	3,030	750	1,430	790	70
California	170,200	55,160	79,640	33,740	1,670	224,800	69,190	105,600	47,360	2,640
Hawaii	5,630	1,670	2,670	1,210	70	8,310	2,440	3,900	1,850	120
Oregon	21,550	6,770	10,050	4,470	270	31,250	9,500	14,550	6,710	490
Washington	34,060	10,560	16,080	7,040	380	59,990	19,190	27,620	12,540	640

1/Figures may not add to total because of rounding.

SOURCE: Projections by the Division of Nursing, Health Resources & Services Administration, U.S. Department of Health and Human Services from criteria presented in Table 4-4 and 4-5.

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Table 10-30. PROJECTED REQUIREMENTS FOR LICENSED PRACTICAL/VOCATIONAL NURSES AND NURSING AIDES ACCORDING TO CRITERIA - BASED MODEL BY GEOGRAPHIC AREA, 1990 AND 2000

Geographic area	1990				2000			
	LP/VNs		Aides		LP/VNs		Aides	
	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound
United States 1	437,840	320,670	1,836,890	1,398,320	493,610	422,660	2,039,800	1,493,110
New England	33,650	23,630	126,340	99,350	34,010	28,310	127,090	95,180
Connecticut	11,080	7,450	39,290	31,300	10,730	8,710	38,190	28,830
Maine	3,190	2,250	12,060	9,360	3,600	2,990	13,530	10,060
Massachusetts	14,840	10,530	56,200	44,290	14,110	11,830	52,900	39,670
New Hampshire	1,590	1,210	7,070	5,310	2,020	1,760	8,890	6,480
Rhode Island	1,360	1,080	5,960	4,590	1,740	1,530	7,050	5,270
Vermont	1,590	1,110	5,760	4,500	1,810	1,490	6,530	4,870
Middle Atlantic	48,380	37,560	224,200	169,240	54,720	48,000	239,420	175,870
New Jersey	9,190	7,170	42,800	32,000	9,690	8,680	44,320	32,100
New York	29,560	21,840	124,850	96,380	31,960	27,230	128,970	96,120
Pennsylvania	9,630	8,550	56,550	40,860	13,070	12,090	66,130	47,650
South Atlantic	56,000	42,500	257,290	192,850	64,070	56,510	293,670	212,300
Delaware	430	420	2,570	1,930	410	450	2,610	1,920
District of Columbia	500	470	3,230	2,370	440	460	2,780	2,000
Florida	10,630	8,080	61,080	43,480	12,910	12,460	76,710	53,060
Georgia	12,940	9,140	51,210	39,450	13,900	11,650	54,970	40,450
Maryland	10,190	7,040	38,090	30,000	11,060	9,100	40,880	30,680
North Carolina	6,660	5,220	33,310	24,650	8,650	7,590	40,120	29,100
South Carolina	3,740	2,870	17,880	13,370	4,670	4,070	21,320	15,510
Virginia	8,750	6,540	37,800	28,870	9,450	8,240	40,720	29,920
West Virginia	2,160	1,920	12,120	8,730	2,580	2,490	13,560	9,660
East South Central	25,520	19,400	115,130	86,250	29,380	25,830	129,160	93,640
Alabama	6,790	5,070	30,320	22,770	7,180	6,270	31,880	23,060
Kentucky	6,770	4,990	28,790	21,630	8,340	7,140	34,230	24,870
Mississippi	3,660	2,920	17,820	13,230	4,930	4,400	22,180	16,150
Tennessee	8,300	6,420	38,200	28,620	8,930	8,020	40,870	29,560
West South Central	46,050	33,940	200,550	151,240	53,190	46,250	231,490	167,780
Arkansas	7,170	5,020	26,800	20,820	8,000	6,700	29,910	22,140
Louisiana	8,040	5,790	33,360	25,310	9,860	8,310	39,890	29,210
Oklahoma	5,030	3,770	23,510	17,500	5,220	4,640	25,070	17,890
Texas	25,810	19,360	116,880	87,610	30,110	26,600	136,620	98,540
East North Central	116,150	81,370	437,310	340,830	129,760	107,390	476,990	355,870
Illinois	36,900	25,790	135,710	106,450	36,100	30,120	132,910	99,170
Indiana	10,070	7,340	42,700	32,530	11,310	9,600	46,550	34,210
Michigan	22,030	15,450	84,370	65,490	24,870	20,530	92,400	68,810
Ohio	28,750	20,200	109,790	85,460	38,180	31,340	137,430	103,160
Wisconsin	18,400	12,590	64,740	50,900	19,300	15,800	67,700	50,520
West North Central	41,760	30,410	166,060	127,270	43,650	37,210	171,500	126,030
Iowa	7,050	5,060	28,400	21,680	6,740	5,730	27,410	19,990
Kansas	5,730	4,170	23,170	17,790	5,660	4,870	23,080	16,950
Minnesota	11,200	8,020	42,430	32,770	11,130	9,360	41,890	30,870
Missouri	7,420	5,910	35,170	26,060	9,430	8,380	41,200	29,890
Nebraska	7,080	4,880	24,480	19,360	7,340	6,040	25,330	19,010
North Dakota	1,330	1,010	5,580	4,220	1,280	1,130	5,430	3,940
South Dakota	1,950	1,360	6,830	5,390	2,070	1,700	7,160	5,380
Mountain	12,240	10,080	64,280	45,750	16,040	14,960	84,500	58,680
Arizona	2,460	2,120	14,200	9,980	4,200	3,920	22,100	15,330
Colorado	2,110	1,990	13,410	9,250	1,910	2,130	14,410	9,620
Idaho	1,490	1,130	6,340	4,640	2,160	1,860	8,900	6,370
Montana	1,750	1,260	6,640	5,080	1,870	1,590	7,160	5,240
Nevada	950	790	5,260	3,670	1,360	1,280	7,730	5,270
New Mexico	960	790	5,180	3,740	1,010	950	5,630	3,960
Utah	1,380	1,160	8,020	5,530	1,720	1,670	10,600	7,100
Wyoming	1,140	840	5,150	3,860	1,810	1,560	7,970	5,790
Pacific	58,090	41,780	245,730	185,540	68,790	58,200	285,980	207,760
Alaska	280	220	1,310	980	380	340	1,730	1,250
California	38,570	28,110	168,750	126,570	42,180	36,200	184,150	132,660
Hawaii	950	770	4,050	3,010	1,640	1,420	6,370	4,690
Oregon	5,960	4,270	24,870	18,800	6,550	5,610	28,170	20,370
Washington	12,330	8,410	46,750	36,180	18,040	14,630	65,560	48,790

1 Figures may not add to total because of rounding.

SOURCE: Projections by the Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, from criteria presented in Tables 4-4 and 4-5.

Table 10-31. PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES ACCORDING TO CRITERIA ESTABLISHED AS UPPER BOUND IN CRITERIA - BASED MODEL BY GEOGRAPHIC AREA AND EDUCATIONAL PREPARATION, 1990 AND 2000

Geographic area	1990					2000				
	Total	AD/Dip.	Bacc.	Mast.	Doct.	Total	AD/Dip.	Bacc.	Mast.	Doct.
United States 1/	2,222,240	680,710	1,078,900	427,240	34,860	2,958,310	885,210	1,423,140	587,270	62,310
New England	133,340	42,040	64,060	24,960	2,200	171,410	53,310	80,650	33,580	3,810
Connecticut	34,920	11,130	16,760	6,480	540	46,310	14,750	21,530	9,010	1,010
Maine	12,580	3,740	6,140	2,470	220	17,610	5,290	8,300	3,610	400
Massachusetts	62,050	19,950	29,740	11,330	1,010	74,730	23,450	35,170	14,430	1,680
New Hampshire	8,930	2,620	4,360	1,810	130	12,970	3,770	6,280	2,680	230
Rhode Island	9,010	2,830	4,210	1,740	220	11,360	3,460	5,390	2,140	350
Vermont	5,850	1,770	2,850	1,130	80	8,430	2,590	3,980	1,710	140
Middle Atlantic	318,610	98,890	154,030	59,960	5,720	382,990	114,570	185,550	73,070	9,770
New Jersey	61,930	19,290	30,170	11,590	880	74,360	220,030	36,630	14,240	1,450
New York	156,220	49,200	75,030	29,050	2,940	188,520	58,040	90,460	35,200	4,810
Pennsylvania	100,460	30,400	48,830	19,320	1,900	120,110	34,500	58,460	23,630	3,510
South Atlantic	347,310	105,100	169,160	67,670	5,270	462,340	135,030	225,460	92,810	8,990
Delaware	5,630	1,710	2,680	1,090	140	6,430	1,800	3,160	1,230	230
District of Columbia	7,050	2,320	3,260	1,220	230	7,150	2,150	3,460	1,190	340
Florida	96,530	29,430	47,560	18,390	1,140	135,940	38,440	68,670	26,840	1,980
Georgia	54,840	16,630	26,700	10,710	790	73,900	22,340	35,170	14,960	1,420
Maryland	40,100	12,580	19,270	7,620	620	54,100	16,920	25,520	10,560	1,100
North Carolina	49,030	14,440	23,950	9,820	810	63,850	18,450	31,040	13,100	1,260
South Carolina	25,200	7,150	12,270	5,330	430	33,370	9,380	15,970	7,210	800
Virginia	49,660	14,890	24,040	9,880	840	64,060	18,690	30,760	13,180	1,430
West Virginia	19,270	5,950	9,430	3,610	270	23,540	6,860	11,710	4,540	430
East South Central	147,310	44,840	71,030	28,870	2,510	194,620	57,440	93,430	39,180	4,520
Alabama	38,950	11,620	18,590	7,860	860	49,300	14,280	23,400	10,090	1,510
Kentucky	34,500	10,500	16,800	6,700	490	48,320	14,450	23,280	9,670	910
Mississippi	24,360	7,310	11,750	4,880	400	33,410	9,830	16,000	6,820	760
Tennessee	49,500	15,410	23,890	9,430	760	63,590	18,880	30,750	12,600	1,340
West South Central	242,730	73,330	118,340	47,410	3,600	339,850	99,870	164,960	68,310	6,690
Arkansas	26,590	8,360	12,840	4,980	400	38,430	11,980	18,280	7,440	720
Louisiana	38,090	11,040	18,450	7,960	630	54,140	15,780	25,690	11,460	1,200
Oklahoma	30,050	8,920	14,670	5,970	470	39,700	11,380	19,270	8,280	770
Texas	148,000	45,010	72,380	28,500	2,100	207,580	60,730	101,700	41,130	4,000
East North Central	444,010	139,670	215,050	82,210	7,060	605,070	189,640	286,340	115,750	13,300
Illinois	132,420	42,700	63,970	23,810	1,940	171,010	54,030	81,240	32,170	3,560
Indiana	51,250	15,540	25,050	9,780	870	66,320	19,770	32,040	12,980	1,520
Michigan	88,080	27,240	42,850	16,590	1,400	118,260	36,690	56,150	22,810	2,600
Ohio	115,610	36,330	56,230	21,230	1,810	170,010	53,830	80,250	32,230	3,690
Wisconsin	56,650	17,860	26,950	10,800	1,040	79,470	25,320	36,680	15,560	1,930
West North Central	187,850	57,530	91,190	36,170	2,890	239,820	72,340	113,650	48,800	4,980
Iowa	31,200	9,340	15,180	6,130	540	38,430	11,290	18,280	7,940	920
Kansas	26,160	7,840	12,650	5,180	480	32,800	9,660	15,460	6,890	780
Minnesota	44,510	13,750	21,520	8,630	600	56,000	17,230	26,210	11,560	990
Missouri	50,230	15,730	24,720	9,090	680	64,720	19,400	31,880	12,250	1,190
Nebraska	21,570	6,760	10,370	4,110	320	30,010	9,540	13,750	6,090	620
North Dakota	7,080	2,070	3,370	1,500	130	8,500	2,430	3,920	1,920	230
South Dakota	7,100	2,040	3,380	1,530	140	9,360	2,790	4,170	2,150	250
Mountain	102,950	29,210	50,630	21,430	1,590	148,720	40,400	73,730	31,670	2,890
Arizona	25,120	7,280	12,380	5,060	380	38,950	10,750	19,540	7,930	710
Colorado	25,120	7,290	12,420	5,080	320	31,440	8,360	16,000	6,600	470
Idaho	8,140	2,210	3,990	1,810	130	12,760	3,570	6,080	2,840	280
Montana	7,850	2,270	3,820	1,630	110	10,460	3,040	4,900	2,310	200
Nevada	8,710	2,460	4,340	1,760	140	14,150	3,730	7,130	2,980	310
New Mexico	9,330	2,520	4,490	2,130	180	11,370	2,990	5,400	2,720	260
Utah	13,060	3,560	6,460	2,770	240	19,330	4,950	9,770	4,160	450
Wyoming	5,640	1,620	2,730	1,190	90	10,260	3,010	4,910	2,130	210
Pacific	298,130	90,100	145,410	58,560	4,020	413,490	122,610	199,390	84,100	7,360
Alaska	2,760	670	1,340	680	60	3,730	910	1,780	930	100
California	216,590	65,770	105,950	42,100	2,760	284,330	83,520	138,230	57,750	4,830
Hawaii	7,100	2,000	3,470	1,510	110	10,470	2,980	5,030	2,250	200
Oregon	27,610	8,290	13,320	5,550	430	39,430	11,490	18,970	8,140	830
Washington	44,070	13,370	21,330	8,720	660	75,530	23,710	35,380	15,030	1,400

1/ Figures may not add to total because of rounding.

SOURCE: Projections by the Division of Nursing, Health Resources and Services Administration, U.S. Department of Health and Human Services, from criteria presented in Table 4-4 and 4-5.

Chapter 11

PUBLIC HEALTH

Introduction

This chapter describes the status of public and community health personnel and the educational support programs undertaken by the Bureau of Health Professions in accordance with section 794 (a) and (c) of the Public Health Service Act. Section 794 requires that detailed descriptions of current and anticipated needs for public and community personnel, and recommendations be prepared and submitted to Congress biennially.

The health of the American people has continued to improve markedly in the past three decades (DHHS, NCHS, 1984). During this period of increasing life expectancy and improving health status the focus of public health activity changed accordingly. While infectious disease surveillance, monitoring, and control measures remain in place, public health initiatives are increasingly directed toward preventing or reducing the incidence and severity of heart disease, cancer, stroke, accidents, premature senile dementia, neurological disorders, substance abuse, and other chronic, degenerative, and disabling disorders.

Special concern over toxic wastes is growing, and with it a concomitant need to address the serious problems of the safe handling and control of chemicals and biological and radioactive substances that can materially affect the health of individuals and the environment.

Behavior-related disorders have become increasingly common and have drawn new attention. Substance abuse, unintentional injuries, and early pregnancy problems continue to plague children and young adults. Industrial production and the widespread use of chemically dependent agricultural methods have provided exceptional affluence, but a byproduct has been environmental degredation. External factors that contribute to the etiology of noninfectious diseases, particularly hazardous chemical and physical agents, raise serious questions about long-term health effects that will be paramount issues throughout the rest of the century.

Special population groups such as the impoverished, the disadvantaged, and migrant and immigrant populations face difficult and costly health problems and service needs. New generations of infectious diseases (acquired immune deficiency syndrome, Legionnaires' disease, and toxic shock syndrome, among others) require diligent and timely surveillance, intervention, and research.

It has been estimated that within the next 50 years more than 16 percent of the Nation's population, 49 million persons, will be 65 years of age or older. Today only 11 percent of the population is in that age group. The trend is expected to lead to increased levels of chronic, long-term health problems with attendant costs, service, and management needs.

Among the highest priorities are ensuring a healthy start in life for all infants and enhancing the health of their mothers. Both are highly amenable to disease prevention and health promotion activities.

These problems will require sustained and systematic efforts from public health personnel, particularly in the areas of preventive services, health protection, and health promotion. National goals in these areas are reflected in recent reports from the Surgeon General, Healthy People and Objectives for the Nation, which provide a blueprint for health status changes that can be accomplished over the next decade.

Current health issues involve more than disease processes and demographic changes, however, since they are intimately related to political, social, and economic choices regarding health care, and the organization, delivery, and financing of services in an evolving system. Issues related to competition among health providers, regulation and deregulation, insurance benefit levels, the development and expansion of technology, ethics, law, costs and affordability, and the distribution and utilization of health care personnel indicate a need for effective management of human, physical, and financial resources.

Developments in the Supply of Public Health Personnel

The public health work force functions in a wide range of settings, including professional associations; foundations; voluntary agencies; Federal, State, and local governments; profitmaking and nonprofit organizations; and educational institutions. A large majority of the public health work force functions in government agencies. Also, public health personnel deal with the public and community implications of health and disease, and take a community or population-based approach to solutions. Therefore, the size, numerical adequacy, training, and competency of the public health work force are matters of direct public concern.

The responsibilities of public health personnel are interdisciplinary and multidisciplinary and include detection, assessment, and monitoring of health problems in populations, prevention of illness, disability, and premature death; health education and health promotion; control or elimination of environmental or occupational factors which results in health problems; health services administration and planning; and planning, organization, and delivery of personal health services by public health agencies.

The personnel who discharge these responsibilities have a broad range of technical and professional backgrounds in public health, personal health, and nonhealth occupations. Included are statisticians; epidemiologists; general and specialized environmental health personnel; public health physicians, dentists, nurses, and veterinarians; health educators; nutritionists; laboratory scientists; health agency, hospital, health maintenance organization, and nursing home/long-term care administrators; health planners and policy analysts; and many other scientific and engineering personnel (Figure 11-1).

The total public health work force, including all who spend part of their time in public health activities, is estimated to exceed 500,000 persons, or about 7 percent of the entire health work force. About half of them spend the majority of their time in public health, and a large majority of these work for public agencies. This report considers these 250,000 to be the primary public health work force. The best estimates to date reveal that somewhat more than 30 percent of the primary public health work force, or approximately 75,000 people, have graduate training in public health.

It is not yet possible to discuss supply and requirements of the public health work force with the precision now applicable to physicians and certain other health professionals. Information for policy and planning must be pieced together from a number of sources creating difficulty in estimating future requirements for public health personnel. Suitable methods for projecting requirements need to be developed while baseline data on supply are lacking, and no ongoing sampling frame exists on which to base projections. Estimates of demand are especially difficult, since demand, measured by budgeted vacancies or other means, is highly dependent on legislation, regulations, and Federal, State and local government initiatives.

The following section presents the results of several recent studies that provide some insight about the supply and requirements for public health professionals. The final section of this report describes current progress in the Bureau of Health Professions' multi-year effort to address the difficult methodologic problem of defining who functions in public health and in what settings, and devising a method to estimate requirements for various public health functions.

Recent Studies

The last two reports to Congress on public and community health personnel presented the results of a number of studies and workshops concerning the public health work force that were carried out during the 1970s and early 1980s (DHHS, 1982, 1984). Since the last report a number of additional studies contributing to available information on public health personnel have been completed.

Staffs of State Health Agencies

In a study by the Association of State and Territorial Health Officials, 47 State health agencies (SHAs) provided information on staffing. Forty-three SHAs provided complete data on their health department staffs.

In 1983, 47 SHAs employed a total of 108,100 full-time equivalent staff, ranging from a high of 15,100 in Puerto Rico, to 11,500 in Maryland, 7,000 in New York, 5,500 in Florida, and 143 in Idaho. Eighteen States reported between 1,000 and 4,000 employees. The Virgin Islands reported the highest ratio of staff to population at 216 employees per 10,000 persons, followed by American Samoa with 99 per 10,000. The lowest -- 0.8 and 0.9 per 10,000 population -- were reported by Illinois, Iowa, and Washington. However, SHAs in some States serve as mental health authorities, operate health-care institutions, and/or serve as the lead environmental agencies for their States. In States without local health departments, the SHA also provides services usually associated with local health departments such as immunizations, perinatal care, or lead-poisoning prevention programs. This is characteristic of the territories, where the population often depends on SHAs for routine personnel health care.

The distribution of the employees of State health agencies by occupation and program area is given in Table 11-1. Forty-three SHAs reported complete data on staffing, by program area and occupation. SHAs in the District of Columbia and Maryland reported data on total staff levels, but did not provide information on employees by program area or occupation. The SHAs in Florida and Mississippi reported data on staffing by occupation, but not by program area.

The 43 SHAs employed 64 percent of their staff in personal health programs. Eight percent were employed in each of the areas of environmental health, health resources, and general administration. Six percent were employed in laboratory programs. Six percent of SHA employees were not identified by program area.

The 45 SHAs reporting comparable data for the period between 1977 and 1982 experienced an overall decrease in staff of 6,300 persons (6 percent). Approximately 30 percent of this decrease (1,900 employees) can be attributed to changes in SHA responsibilites during the comparison period. The number of SHAs serving as mental health authorities declined. Changes also occurred in SHA responsibility for environmental programs. Twenty-six SHAs (58 percent) reported decreases in the number of employees and 19 reported increases.

Thirty-eight SHAs reported comparable data by program area for the period 1977 to 1982. Table 11-2 displays trends in staffing by program area. There were decreases in all program areas during the period except noninstitutional personal health, where staffing increased by 8 percent. The largest decreases occurred in environmental health (8 percent) and in SHA-operated institutions (12 percent).

Forty-three SHAs are included in the analysis of staffing trends by occupation. Between 1977 and 1982, eight occupational categories experienced decreases in staffing. Four categories (nutritionists; planners, economists, programmers, and analysts; registered nurses; other professional and technical employees) showed increases in personnel during this period (Table 11-3). The greatest increases occurred in the planners and programmers category (49 percent) and among nutritionists (44 percent). The large increase among programmers and analysts may reflect the almost universal increase in the use of computer-based technology since 1978 to aid in cost-containment efforts.

Occupational categories showing the largest decreases included physicians (23 percent), social workers (12 percent), health educators (10 percent), and engineers and sanitarians (10 percent). These decreases may be attributable to (a) change in SHA functions (b) a requirement to allocate a greater proportion of available funds to functions carried out by other personnel, (c) an actual decrease in needs for these types of public health workers or (d) inability to recruit replacements for lost staff. Data which would show the extent to which the various factors are responsible for the decreases is not available.

Biostatistics

To improve sketchy information on supply and requirements for biostatisticians, the Bureau of Health Professions supported a review of the field by the Association of Schools of Public Health (Greenberg and Magee, 1985). The review, though limited in scope, found that there are many more jobs than biostatisticians to fill them. Discussions among faculty members and school employment counselors futher attest to the demand for biostatisticians. Doctoral-level biostatisticians were found to be in especially short supply.

Although some educational institutions anticipate less government employment for biostatisticians in the future, the present demand appears high. It is reported that in at least half the clinical trial studies funded by the National Heart Institute there has been difficulty in filling the biostatistician position. Shortages were also noted in academic settings.

Relatively few biostatisticians are graduated each year to meet these needs. Schools of public health graduate about 140-150 biostatisticians annually and graduate programs outside the schools of public health graduate about 50. Only about one-quarter of the school of public health graduates each year are doctorates.

It is also unknown whether the schools of public health will continue to graduate biostatisticians at the current level. About half the schools reported a decrease in applications during the past few years and there is reason to expect that this will continue. Increased tuition costs and the decline in financial support for public health students are reasons cited for the decline.

Public Health Nutrition

Several special studies conducted in the past few years have suggested shortages of public health nutritionists. The most recent study related nutritional factors to Objectives for the Nation (Brown, 1985). This study also analyzed research reports to determine the effectiveness of nutrition services in improving health and reducing health care costs, and examined the supply-demand situation for public health nutritionists. Problem-oriented nutrition services were found effective in reducing the incidence of low birthweight in newborns (which greatly reduces infant mortality rates), iron deficiency anemia, obesity, dental caries, serum cholesterol (and risk of heart disease), and blood pressure. Brown concluded:

> (T)he benefits to society, both in terms of enhanced quality of life and money saved in medical expenses averted by improvements in

nutritional status, far outweigh the costs of providing nutrition services.

Brown found that the supply of public health nutritionists who provide these vital services has never caught up with the demand. She also found an acute shortage of doctorate-level public health nutritionists needed in training programs and in senior positions in the nutrition units of health agencies. The current short supply is exacerbated by decreased enrollment in graduate training programs, partly attributed to reductions in student aid.

Brown's study also found that demand for public health nutritionists has remained strong because of the need created by health, nutrition, and food assistance programs and services provided by public and private agencies. Such programs include health services for handicapped children; home health and primary care programs; community and worksite health promotion programs; health maintenance organizations; the special supplemental food program for women, infants, and children; the nutrition education and training program; and nutrition programs for older Americans.

Positions requiring the skills of public health nutritionists also appear to be growing in private nonprofit health care delivery organizations. As health care expands from hospital-based to community-based systems, opportunities for employment are created beyond traditional agency positions.

The growing interest of Americans in improving their health through exercise and nutrition have futher increased the demand for the services of nutritionists. There is an increased demand for nutrition information in the mass media and for nutrition services in settings such as physicians' offices, fitness centers, health maintenance organizations, social and health programs for the aged and disabled, outpatient clinics, and worksite health promotion programs.

Between 1974 and 1981 approximately 200 new graduates from public health nutrition programs entered the work force each year. In 1984, 141 nutritionists graduated with a master's degree, 30 percent fewer than in the years prior to 1981, and only 9 received doctorate degrees. The number of applicants and students in training programs has decreased by more than one-third (38 percent) since 1980. This production of new graduates is sufficient to replace those leaving the work force, but is not sufficient to meet the current shortages and projected future increased demand (there are approximately 2,000 nutritionists working in public agencies plus a small unknown number in other settings).

Three other studies also found shortages of public health nutritionists. Brown (1982) conducted a survey of 1975-80 graduates and reported their employment characteristics. Kaufman (1978) examined the need for public health nutritionists in medically underserved areas. The number of unfilled public health nutrition positions within State health agencies has been periodically reported in Personnel in Public Health Nutrition for the 1980s. An excess of unfilled positions is revealed by all three studies. Brown summarized her findings as follows:

> (P)ressure on the supply of public health nutritionists for public health positions will continue. The gap between supply and demand will likely broaden due to a continuation in enrollment decline within graduate training programs, and an expansion in nonpublic health agency positions.

Epidemiology

A recently completed study titled "A Review of the Field of Epidemiology: Current Activities and Training of Practitioners" (Magee, 1983) provides an update of information since the last report to Congress. Although precise data on the work force were not available, a review of available information and interviews with experts in the field led Magee to conclude:

> There is an increasing demand for epidemiologists in a growing number of areas. Experts see a future demand in the following areas -- traditional public health agencies, research institutions (both private and Federal, including a demand from military sources), industry, health care providers (both public and private), overseas work (both international welfare programs and to fill gaps in countries with a shortage of epidemiologists), and educational institutions.
>
> Jobs in private industry are expected to grow, at least in certain fields. Drug trials are expected to be a major area of employment, as drug companies increasingly use epidemiologists in the evaluation of new products. Another employment area cited is insurance companies and private health care providers such as HMOs.

Although no surveys of the work force have been conducted, Magee reported a consensus of experts in the field suggesting there are about 2,000 to 2,500 epidemiologists currently employed. In 1981-82 there were 356 epidemiology graduates. Since this includes both master's and doctoral graduates, and at least half of the master's graduates obtain doctorates, this is probably sufficient to replace those who leave the work force but will not alleviate current or projected shortages. Although this analysis supports conclusions in the previous reports to the Congress (DHHS, 1982, 1984), in-depth study of the work force has yet to be conducted.

National Public Health Vacancy Reporting System

The American Public Health Association (APHA) has been studying the feasibility of establishing and operating a national computerized system of reporting budgeted vacancies for public health personnel in the United States (APHA, 1983). APHA's preliminary study found that on any given day 5 to 10 percent of budgeted positions in State and local health departments are unfilled. Conservatively estimating that 50,000 budgeted positions require credentials at the baccalaureate level or above, there should be 2,500 to 5,000 vacant public health positions throughout the country on any given day. APHA is now examining the feasibility of establishing a permanent vacancy reporting system.

Employee Compensation in Local Health Departments

The American Public Health Association conducted a national survey of public health personnel compensation during 1982 (APHA, 1984). Directors of local health departments throughout the country were asked to provide information about the size of the populations they serve, their operating budgets, and the number of persons employed in their organizations. They were also asked to provide information about the median salaries for full-time health administrators, health educators, laboratory technicians, public health nurses, public health physicians, and sanitarians within their agencies. Table 11-4 presents median salaries for the health professions surveyed.

Health Administration

A joint study by Korn/Ferry International and the Association of University Programs in Health Administration summarized data gathered from health administration graduates for the 5-year period 1979-83. Data were presented accompanied by a commentary provided by a panel of leaders in the field. Key findings of the study were as follows:

- Results from the survey indicate that graduates of health administration programs are continuing to find employment opportunities in the health care industry, although initial assignments are shifting from assistant administrator-level positions to department-level positions with primary emphasis on systems development, marketing, organizational planning, and quality assurance. Graduates find employment within 6 months of graduation and usually with the employer of first choice. Hospitals continue to be the source of most initial employment opportunities. Opportunities with consulting organizations and health maintenance organizations have increased, but opportunities within HSAs and government agencies have declined.

- Approximately 40 percent of the graduates indicate that general administrative is their primary function. Major areas of responsibility cited are general planning, information systems, management of cost containment programs, quality assurance, and health promotion and disease prevention. The most notable employment gains across the 5 years are in the cost containment, quality assurance, general planning, and information systems areas.

- The cost of education has risen sharply, and borrowing to support that education has also increased. There is a trend toward loans and a notable decrease in full- and part-time employment, traineeships, fellowships, scholarship and grant support, and family income to finance education. Generally, graduates complete their programs with an average debt of about $8,500. Starting salaries average about $27,000; 1983 graduates are completing their programs with a debt level that is about one-third higher than previous graduates.

Data Availability

The limited data on the status of public health personnel, obtained from disparate sources and the experience of experts, are helpful but not sufficiently accurate for optimally directing resources for the preparation of public health personnel. Better data on the distribution, function, and adequacy of supply of public health personnel needs to be obtained in order to adequately address emerging and priority disease prevention and health promotion initiatives. Consequently, a project has been developed to field questionnaires to public health and community health employers and employees to gather basic work force data on the distribution and characteristics of public health and community health personnel.

Building on the work previously undertaken by the Bureau of Health Professions, a protocol including data collection instruments, sampling plan, and data management plan will be fielded in a two-stage sample survey. In the first stage, employers in a number of different types of public/community health settings will be contacted and asked to provide lists of their public/community health employees along with basic total numbers of full- and part-time employees. In the second stage, a sample of employees will be asked to provide information about their education, functions, and background. Results will show, for the first time with any certainly, how public health agencies employ and use personnel and how staff have acquired training and experience. Among other uses, data will provide educators with priorities for recruiting students into specialized programs and for providing continuing education opportunities.

Conclusions

Although supply and requirements for public health personnel cannot be discussed with the same precision as other health professions, existing studies and prevailing professional judgments point to several occupations with personnel shortages and other occupations in which qualified personnel are difficult to recruit. There are perceived shortages of epidemiologists, environmental health professionals including toxicologists, biostatisticians, nutritionists, public health nurses, and physicians trained in public health and preventive medicine. Studies are under development to verify these preceived shortages.

Development in the Education of Public Health Personnel

In 1985 there are 23 accredited schools and programs of public health in the United States, including a school at the University of Puerto Rico. Traditionally, these schools have educated personnel to function in a variety of public and private settings, ranging from State and local government to health care facilities and private industry.

In addition to the individuals trained in the accredited schools of public health, which produce master's and doctorate degree personnel, graduate programs outside schools of public health produce a significant number of professionals who function in the public health arena, for example, health service administrators, environmental health scientists, nurses, social workers, and psychologists. In addition, graduates from baccalaureate programs make up a significant portion of public health personnel, for example, school health educators, entry level environmental health personnel nurses, and statisticians.

Since data concerning all of public health educational programs are not available, this section focuses on the information available for 1982-83 from the Association of Schools of Public Health and the Association of University Programs in Health Administration. Preliminary data for academic year 1983-84, indicate little, if any, changes from previous trends. The last report to Congress (DHHS, 1984) provided information on programs outside schools of public health; new data have not been collected since that report.

Schools of Public Health

Applications. In academic year 1982-83, 22 of 23 schools of public health (University of San Diego not included) received 10,021 applications (ASPH, 1985). This represents a decrease of 16 percent from the 1980-81 total of 11,898 applications to 21 schools and programs of public health (ASPH, 1982). Not all schools have reported each year, but data for 17 schools that have reported consistently show that applications have been decreasing since 1978-79. In 1982, there was a 16 percent decrease among the 17 schools over the previous year.

In 1982-83, 60 percent of the applications were accepted versus 50 percent in 1981-82. Few details are known about the actual number of applicants, since many individuals apply to more than one school. The trend continues for more women than men to apply to these programs. In 1980-81, approximately 55 percent of the applications were from women while in 1982-83, women accounted for 57 percent of the applications.

Enrollment. In academic year 1982-83, total enrollment in the 23 schools was 8,896, up 4.6 percent from the 1980-81 total enrollment in 21 schools (not including off-campus students). Thirteen schools reported fewer students in 1982 than in 1981; decreases ranged from 2 percent to 24 percent. Public schools suffered the greatest decrease -- 10 of the 14 public schools had fewer students, for an overall decrease of about 5 percent. Of the private schools, 3 of 8 had fewer students in 1982, and total enrollment in private schools increased by about 3 percent. Enrollments for the 17 schools reporting consistently since 1974 are as follows:

Year	Total enrollment	Percentage change
1974	5,624	
1975	5,999	+7%
1976	6,250	+4%
1977	6,406	+3%
1978	7,056	+10%
1979	7,538	+7%
1980	7,770	+3%
1981	7,526	-3%
1982	7,283	-3%

About 57 percent of the 1982-83 enrollment was female, compared to 55 percent in 1980-81. The proportion of black students in 1982-83 was 5.8 percent, compared to 6.3 percent in 1980-81; hispanic enrollment in 1982-83 was 5.1 percent, compared to 4.0 percent in 1980-81 (both academic years include the University of Puerto Rico's hispanic enrollment).

Part-time enrollment within the past years has increased significantly; 33 percent of the students were enrolled part-time in 1982-83 compared to 22 percent in 1980-81. Of the enrolled students, 11.7 percent have prior M.D. degrees (nearly half are foreign citizens), 4.1 percent have other health or doctorate degrees, and 22.6 percent have prior master's degrees. Foreign students have increased from 10.8 percent in 1980-81 to 13.5 percent in 1982-83. The median age of students (29.5) continues to increase.

The areas of specialization of students have remained relatively stable. The areas of specialization for academic year 1982-83 were as follows:

Area of Specialization	No. of Students	Percentage
Biostatistics	559	6.4%
Epidemiology	1,070	12.2%
Health services administration	2,107	24.0%
Public health practice	645	7.3%
Health Education	590	6.7%
Environmental Sciences	1,122	12.8%
Occupational safety and health	313	3.6%
Nutrition	373	4.3%
Biomedical and laboratory sciences	348	4.0%
Other	859	9.8%
No specialization	783	8.9%
Unknown	127	--
	8,896	100.0%

Graduates. Approximately 3,492 students received degrees from accredited schools or programs of public health in 1982-83 (ASPH, 1985). This represents an increase of 8.3 percent over the 1980-81 graduate total of 3,042. In general, the characteristics of graduates parallel those of students.

A special analysis was conducted in 1982-83 on graduates with prior MD degrees. A total of 456 graduates were identified with 212 or 46 percent being foreign citizens. The specialty area with the most MDs was health services administration, which accounted for nearly one quarter of all MD U.S. citizen graduates from schools of public health. There were also 40 MD epidemiologist graduates in 1982-83. In addition to the MDs graduating from schools of public health, there were also 282 preventive medicine/public health residents in 1984 (Table 3-37).

Considering that some of the MD graduates of schools of public health and the residents go into administration or return to clinical practice, this output of new physicians trained in public health is sufficient to replace those that leave the workforce and will allow a very small growth of about 50 annually. In 1982, the AMA reported nearly 3,000 physicians active in preventive medicine/public health (Table 3-4), which constituted a net increase of 44 from 1981.

Health Services Administration

Nearly all 23 schools and programs of public health train health services administrators, the single largest area of specialization in public health. According to the ASPH, 962 or 27.6 percent of the graduates from the 23 accredited schools of public health in academic year 1982-83 received graduate degrees in health administration (ASPH, 1985). Currently, 13 of the departments of health services administration in schools of public health are accredited by the Accrediting Commission on Education for Health Service Administration (ACEHSA), in addition to accreditation by the Council on Education for Public Health (CEPH). The Association of University Programs in Health Administration reports that there are 34 accredited graduate programs in health administration outside schools of public health in the United States (AUPHA, 1985).

The following table summarizes health administration programs accredited by ACEHSA, excluding the 13 ACEHSA-accredited programs in schools of public health and 5 Canadian programs. The data indicate overall trends in education outside schools of public health for health administration as of academic years 1980-81 and 1982-83.

	Academic year 1980-81	Academic year 1982-83	Change
No. Programs	26	32	23.1%
Applications	3,769	3,926	4.2%
Total enrollment	2,194	3,206	31.6%
Part-time	22.9%	37.1%	14.2%
Female	44.6%	54.7%	10.1%
Minority	9.3%	8.2%	-1.1%
Graduates	917[1]	916[2]	-0.0%

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[1] For academic year 1979-80.
[2] For academic year 1981-82.

Source: Association of University Programs in Health Administration, 1985.

Occupational Safety and Health

The National Institute of Occupational Safety and Health provides support to educate personnel in several related areas. In FY 1984 and 1985 $8.76 million was provided each year to support 15 Educational Resource Centers and other training programs at over 40 colleges and universities. The number of students in these programs were as follows:

	Undergraduate		Graduate
	Full-time	Part-time	
Occupational Medicine	132	76	63
Occupational Nursing	78	18	42
Industrial Hygiene	497	185	257
Occupational Safety	131	31	51
Total	838	310	413

In addition, more than 1,500 students in other fields were given courses in occupational safety and health, and more than 12,000 practitioners received continuing education courses with these funds.

Recent Studies of Public Health Education

Since the last report to Congress (DHHS, 1984), four areas of public health education have been studied: environmental health, epidemiology, biostatistics, and public health nutrition. The results of these studies are summarized below.

Environmental Health. The last report to Congress stressed the need to strengthen the educational preparation of environmental health personnel, particularly in the following areas:

- Risk assessment
- Environmental epidemiology
- Applications of computer technology
- Industrial hygiene
- Environmental health planning and management.

The need to expand the knowledge of new environmental health graduates, as well as upgrade the skills of the current environmental health work force, remains paramount. There are few public health problems that demand the expertise of such a wide variety of disciplines. Risk assessment and the management of problems related to hazardous materials demand a unified interdisiciplinary team approach involving experts in chemistry, industrial hygiene, toxicology, hydrology, geology, and epidemiology. Involvement also is needed from engineers, local environmental health workers, emergency care physicians, elected officials, and fire and law enforcement personnel.

A meeting of environmental health specialists was held in November 1984 to discuss training needs, especially those related to risk assessment. One recommendation resulting from this meeting was that a model approach to risk assessment and hazard elimination be developed for implementation by National, State, and local agencies. The group also found a need for further research in such areas as the transport mechanisms of toxic materials in the human body, studies of toxic contaminates in ground water, and the absorption of hazardous materials in the food chain.

Epidemiology. A 1983 study found three major changes taking place in the education of epidemiologists:

- There has been a steady growth in the number of epidemiology graduates, from 203 in 1974-75, to 356 in 1981-82.
- Substantial changes have occurred in curriculum content and focus, from an earlier biological/infectious disease emphasis to a more methodological focus and an increase in the areas of epidemiologic specialization.
- A change has occurred in student characteristics, from a relatively small homogeneous group of medically-trained males

to a large and diverse student population.

Current areas of emphasis in epidemiology training programs include chronic disease epidemiology, infectious disease epidemiology, environmental and occupational epidemiology, psychosocial epidemiology, health services evaluation, nutritional epidemiology, genetic epidemiology, clinical epidemiology, dental epidemiology, and veterinary epidemiology (Magee, 1983).

Biostatistics. All of the 23 accredited schools and programs of public health in the United States offer master's degrees in biostatistics. In addition, coursework in biostatistics is part of the core curriculum for all master of public health students in schools of public health.

There were 573 graduate students enrolled in biostatistics training programs during the 1984-85 academic year. Of the graduate students enrolled in biostatistics programs in 1984-85, almost half (46 percent) were enrolled in doctorate programs. Over 26 percent of the biostatistics degrees awarded in 1982-83 were doctorates. Demographic data available for 1982-83 biostatistics students indicate 56 percent were female and 15 percent foreign; 13 percent of the U.S. students were members of minority groups. Over the last 10 years the proportion of female students has risen significantly (from 41 percent in 1975), while the proportion of minorities and foreign students has increased slightly.

Public Health Nutrition. The major source of public health nutritionists in the United States is the 19 graduate programs in public health nutrition. About half of these programs and 75 percent of the students are in schools of public health. Between 1974 and 1981 about 200 new graduates from public health nutrition training programs entered the work force annually. In 1984, 141 nutritionists graduated with master's degrees (30 percent fewer than prior to 1981), and 9 received doctorate degrees. Data recently provided by 12 graduate programs in public health nutrition indicate a 38 percent decrease since 1980 in both the number of applicants and the number of students enrolled in training programs. Approximately 10 doctorate-level students are expected to graduate in 1985, about the same as in 1981.

Federal Support for Education in Public Health

This section describes educational support programs undertaken by the Bureau of Health Professions to implement public health training authorities in Title VII of the Public Health Service Act, as amended by the Omnibus Budget Reconciliation Act of 1981, and updates information provided in the previous reports to the Congress (DHHS, 1982 and 1984).

Institutional expenditures for 22 of the 23 accredited schools of public health in 1982-83 (Oklahoma not included) reached $230 million (Magee, 1984), $28 million more than in 1979-80 (ASHP, 1982). These expenditures were distributed as follows: Federal Government programs accounted for 39.4 percent

(28.4 percent as research grant support, 7.2 percent as training program supports, and 3.7 percent in student aid); State and local governments, foundations, and other private sources 11.8 percent; and university funds 48.9 percent (Magee, 1984).

The Federal funds supporting public health education include National Institute for Occupational Safety and Health Training Center Grants, National Institutes of Health Research Training Grants, and Health Resources and Services Administration, Public Health and Health Administration Training Grants. In 1984, 107 Public Health/Health Administration Training Grants were awarded -- 23 for Public Health Capitation ($4.79 million), 23 for Public Health Traineeships ($2.543 million), 29 for Health Administration Graduate Programs ($1.43 million), and 32 for Health Administration Traineeships ($0.475 million).

Table 11-5 provides actual appropriations for public health and health administration training, by type of support, for fiscal years 1957 to 1984. From 1982 to 1984 total appropriations for institutional assistance increased by $662,000 or 10.5 percent, and appropriations for student assistance decreased by $311,000 or 9.3 percent.

Table 11-6 shows grant support for graduate education in health services administration under Public Law 94-484, by type of support, number of grants, and funds awarded, for fiscal years 1978 to 1984. During the period 1982-84 the total number of institutions eligible for support remained constant at 23 for schools of public health and increased from 24 to 29 for graduate programs in health administration.

Table 11-7 reports public health and health administration traineeship grants, funds awarded, number of students supported, and average amount of award per student for fiscal year 1984. From 1982 to 1984 the total number of public health students receiving traineeships decreased from 1,517 to 1,439, and the number of health administration students receiving traineeships increased from 260 to 356. In both categories of students there was a decrease in the average award per student. Per student awards decreased from $1,879 to $1,768 for public health students and from $1,830 to $1,334 for health administration students.

During 1984 students were awarded Public Health/Health Administration Traineeships according to the following distribution:

Specialty	Number of trainees	Total awarded
Health administration (P.H. & H.A. programs)	923	$1,379,665
Epidemiology	175	326,488
Environmental health	168	275,070
Biostatistics	78	215,333
Health education	138	212,806
Maternal and child health	87	160,957
Nutrition	86	138,848
Occupational health	21	35,726
Laboratory	5	29,259
Preventive medicine preventive dentistry	6	10,140
Other	108	233,708
Total	1,795	$3,018,000

Table 11-8 shows the number of schools receiving public health traineeships by area of specialization for fiscal years 1978-1984. As this table shows, the distribution of students receiving traineeships by area of specialization has remained essentially constant during the period 1982-84. When the number of traineeship recipients in health administration graduate programs is added to the number of health services administration students receiving traineeships in schools of public health, the total number of trainees specializing in health administration increased from 886 in 1982 to 923 in 1984.

Recommendations

Section 794(c) of the Public Health Service Act requires that each biennial report to Congress on public health personnel contain such recommendations "as the Secretary determines are needed to improve the programs under this subpart." The following recommendations are made in accordance with Section 794(c).

Requirements for public health personnel cannot be precisely quantified with existing data and methodologies. It is possible, however, to identify areas of current and future need by examining the experience of employers, educators, and practitioners with long experience in public health. The previous two reports to the Congress (DHHS, 1982, 1984) reported the small aggregate number of the primary public health workforce (250,000 or 3.5 percent of the health care work force) and concluded there were several areas in which critical shortages were likely. Workshops in 1981 and 1982 (DHHS, 1982); and followup reports in 1983 and 1985 (Magee, 1983; Brown, 1985; Greenberg and Magee, 1985) confirmed these findings and suggested the following areas need increased production of highly trained public health specialists.

- Epidemiologists who can deal with noninfectious diseases and trauma, particularly those of environmental and behavioral origins.

- Environmental health professionals trained in toxicology and assessment of the risks associated with hazardous chemical and physical substances.

- Biostatisticians competent in the design and implementation of highly controlled studies.

- Nutritionists trained in public health, especially at the doctorate level, who can function as researchers and faculty members.

- Health administrators educated to address changing cost containment and reimbursement issues.

- Nurses with a public/community health orientation, who can identify high-risk groups, work with community organizations in prevention programs, and deal with the special needs of the elderly, chronically ill, and disadvantaged.

- Physicians trained in public health and preventive medicine.

It is recommended that the schools need to pay closer attention to the types of students they seek. The recruitment of physicians, other health professionals, scientists, and engineers in related disciplines -- that is, individuals with backgrounds best suited to contribute to public health work -- is lagging. Furthermore, recruitment efforts aimed at minorities are no longer attracting the numbers of individuals they once were. Personnel entering public health work not only need a thorough grounding in substantive program areas, but also need improved applied research skills in public and community health work. Faculty who can teach these skills, especially in the newer and still evolving problem areas, appear to be in short supply.

Recruitment of Physicians and Scientists

The shortage of physicians and certain scientists (e.g., nutritionists and toxicologists) opting for advanced public health training is a major issue. Their scientific and technical backgrounds, when coupled with graduate preparation in the public health sciences, uniquely qualifies them for leadership in practice, research, and faculty roles identified as being in short supply.

Shortages of physicians in public health are likely to continue. The number of physicians who regard themselves as primarily working in preventive medicine has declined steadily in recent years. Residency programs in preventive medicine are operating at less than capacity. Equally important are the technical and experiential backgrounds brought to the field by engineers, toxicologists, nutritionists, chemists, pathologists, and behavorial scientists. For many years, engineers entered public health training in steady numbers and filled leadership roles in environmental health. Since the early 1970s, however, their numbers in the field have decreased significantly, and very few currently enter public health training programs. Few toxicologists, whose basic competence is vital to assessment and solution of problems related to hazardous chemical agents in the environment, are receiving public health training that is essential not only for analysis and solution of the major public health problems of the coming decades, but to serve in faculty positions where a critically short supply now exists. The small number of highly trained nutritionists entering public health training, particularly those pursing doctoral education, presents similar dilemmas. It is therefore recommended that the increased efforts be undertaken to recruit more physicians and scientists into the field of public health.

Scientific Training

It appears that graduates of public health and health administration training programs continue to be readily absorbed into the job market. At issue, however, is whether training in the public health sciences (e.g., epidemiology and environmental health) is receiving as much emphasis in the schools as health administration and health education. Overall, more than 52 percent of all public health graduates are in health administration and health education, with only about 30 percent of new graduates specializing in environmental and occupational health, epidemiology, health statistics, nutrition, and preventive medicine -- precisely those areas in which a new generation of health problems are emerging. It is therefore recommended that schools increase the proportion of students in the public health sciences.

Needs of Working Professionals

In 1980 it was estimated that of a primary public health work force of approximately 250,000 individuals, about 25 percent had graduate training in public health. Estimates for 1985 suggest that approximately 75,000 personnel or about 30 percent have such training. Although precise data are not available, experts contend that large proportions of the environmental health, public health nursing, nutrition, and health education personnel currently in the work force have not received formal basic preparation in public health principles, theory, and methods.

Beyond deficiencies in basic preparation, public health employers are worried that information and technology are being transferred too slowly from academic and research settings to agencies that have operating responsibilities for public health programs. Many individuals who were initially well trained and highly competent may not have had access to education in new technologists over the course of their careers. It is recommended that increased emphasis be given to professional development programs for practicing public health professionals.

It is also recommended that education and service linkages between the schools of public health, programs in graduate health administration, and public health agencies be strengthened. Such linkages are essential if schools of public health and graduate programs in health administration are to respond rapidly to the needs of State and local health departments and other sectors of the health care system concerned with the health of the Nation.

Availability of Faculty and Researchers

The Bureau of Health Professions' 1981-82 workshop series on public health personnel (DHHS, 1982) identified a shortage of qualified faculty and researchers with expertise in a number of high-priority subject areas. Faculty and researchers in chronic disease and environmental epidemiology, toxicology, and risk assessment of chemical and physical agents in the environment are reported to be in high demand and low supply. Difficulties in recruiting physicians for faculty positions in public health are also reported. A second group expected to be in short supply in university faculties includes nutritionists, occupational health specialists (nurses, industrial hygienists), and analytical scientists (mathematical statisticians, biostatisticians, and computer specialists). In each of these groups, competition between universities and private industry is expected to be keen, particularly for those with extensive training and experience. Salary differentials between universities and industry suggest that the recruitment problems of academic and research institutions will continue. It is therefore recommended that approaches be developed to address the recruitment and retention gap of highly skilled faculty and researchers.

Acquiring Timely and Accurate Supply and Requirements Data

As discussed in the previous reports to Congress (DHHS, 1982, 1984), policy development and decisionmaking are seriously hampered by the lack of data on the public health work force and therefore on the magnitude of quantitative and qualitative shortages. Acceptable data have been developed very recently on the numbers of students being trained and their characteristics. Efforts are being made to improve methods for estimating supply and requirements in public health and to devise systematic approaches to obtaining key work force data. Nevertheless, there are very few usable data sets on the characteristics of the work force and the determinants of demand for public health personnel. In the absence of trend data, more reliance must be placed on expert advice secured through workshops and similar measures. Because professional categories in public health are diverse, imprecisely delineated, and frequently overlapping, and because these personnel are employed in such a wide spectrum of agencies, foundations, and firms, the technical problems to be solved are complex. These difficulties suggest that attempts to upgrade the existing data base depends on long-term collaboration among public health agencies, educational institutions and industry. It is recommended that timely and accurate data on the supply and requirements for public health personnel be acquired.

Health Promotion and Disease Prevention

In September 1984 a series of five workshops was conducted by the Bureau of Health Professions to develop recommendations for training health professionals to be more effective in health promotion and disease prevention activities. The worshop series, titled "Health Promotion/Disease Prevention: Impact on Health Professions," covered allied health, public health, and primary care personnel working in various health care settings such as private practice, health maintenance organizations, hospitals, State and local governments, voluntary health organizations, and industry. The recommendations addressed the following areas: increasing the effectiveness of faculty in teaching preventive concepts; developing curricula to allow more meaningful material in didactic and experiential education; selecting students who demonstrate positive attitude and behavior toward health promotion and disease prevention; including these concepts in accreditation standards and certification and licensure examinations; expanding research in these areas; and developing closer links between industry and the health profession education community. The recommendations represent a comprehensive strategy for health profession educators to address health promotion and disease prevention concepts through the educational process. It is recommended that the strategy of incorporating health promotion and disease prevention concepts in the education of health professionals (as proposed by five workshops in 1983) be implemented.

Summary

- The total public health work force, including all those who spend a part of their time in public health activities, is estimated to exceed 500,000 persons, or about 7 percent of the entire health work force. About half of this number spend the majority of their time in public health, are considered to be the primary public health work force. A large majority of these work for public agencies.

- The best estimates to date are that more than 30 percent of the primary public health work force, approximately 75,000 people, have graduate training in public health.

- In 1985 there are 23 accredited schools of public health. These schools graduated 3,492 students in 1982-83.

- The number of applications to schools of public health have been decreasing rapidly in recent years (down 16 percent from 1980-81 to 1982-83) and the number of part-time students has increased to one-third of the student body.

- In 1985 there are 52 accredited health administration programs (including 13 in schools of public health and 5 Canadian schools). The 34 U.S. accredited programs outside schools of public health graduated 916 students in 1982-83, while reporting a 31.6 percent increase in enrollment and a 14.2 percent increase in part-time students during the period 1980-81 and 1982-83.

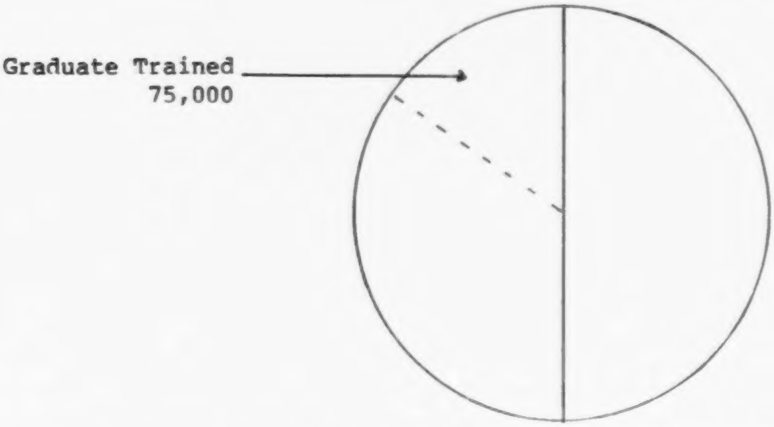
- Existing studies and prevailing professional judgments point to personnel shortages in several occupations and difficulties of recruitment in other occupations. Needs exist for increased production of the following highly trained specialists: epidemiologists; environmental health professionals including toxicologists; biostatisticians; nutritionists; public health nurses; and physicians trained in public health and preventive medicine.

- The shortage of physicians and certain scientists (e.g., nutritionists and toxicologists) opting for advanced public health training is an issue. Their scientific and technical background, when coupled with graduate preparation in the public health sciences, uniquely qualifies them for leadership in practice, research, and faculty roles. Shortages of physicians in public health are likely to continue. The number of physicians who regard themselves as primarily working in preventive medicine has steadily declined in recent years. Residency programs in preventive medicine are operating at less than capacity and physician graduates of schools of public health continue to decline. There is also a shortage of physician epidemiologists.

- Of equal importance are the technical and experiential backgrounds brought to the public health field by engineers and scientists such as toxicologists, nutritionists, chemists, pathologists, an behavorial scientists. Engineers entered public health training in steady numbers and filled leadership roles in environmental health for many years. Since the early 1970s, however, their numbers in the field have decreased significantly, and very few are now entering public health training programs. For toxicologists, whose basic competence is vital to assessment and solution of problems related to hazardous chemical agents in the environment, public health training is essential, not only to analyze and solve major public health problems of the coming decades, but to serve in faculty positions where a critically short supply now exists. The small number of highly trained nutritionists entering public health training, particularly those pursuing doctoral education, presents similar dilemmas.

Figure 11-1. THE PUBLIC HEALTH WORK FORCE, 1984

Total: Approximately 500,000



PRIMARY PUBLIC HEALTH WORK FORCE

About 250,000 persons, or about half of the public health work force, perform public health functions full time or work for public health agencies.

- o Epidemiologists
- o Health Statisticians
- o Nutritionists
- o Health Educators
- o Sanitarians
- o Industrial Hygienists
- o Occupational Health & Safety Specialists
- o Toxicologists
- o Researchers & Faculty
- o Physicians in Public Health & Preventive Medicine
- o Public Health Nurses
- o Schools Health Nurses
- o Public Health Dentists, Veterinarians & Laboratory Personnel
- o Health Services Administrators
- o Health Planners
- o Nursing Home Administrators
- o Hospital Administrators

SECONDARY PUBLIC HEALTH WORK FORCE

More than 250,000 other persons work as technicians or perform public health functions occasionally or part time. Most of these personnel work in areas related to environmental or occupational health.

- o Scientists
- o Engineers
- o Consultants
- o Technicians
- o Health Professionals: Physicians, Dentists, Nurses, & Others
- o Mental Health Personnel
- o Social Workers

SOURCE: Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, 1985.

Table 11-1. FULL-TIME EQUIVALENT STAFFS OF STATE HEALTH AGENCIES, BY OCCUPATION AND PROGRAM AREA: DECEMBER 31, 1982

		Personal health						
Occupation	Total public health[1]	Noninstitutional personal health	SHA-operated institutions	Environmental health	Health resources	Laboratory	General administration	Unidentifiable by program area
All professional, administrative, and technical	50,827	17,846	13,642	6,052	4,289	3,578	2,960	2,460
Physician	2,185	730	1,069	14	84	73	73	142
Dentists	409	297	53	6	18	-	11	24
Veterinarians	78	15	1	51	-	8	3	-
Registered nurses	12,804	6,785	4,183	12	707	2	93	1,022
Licensed practical nurses	3,963	714	2,988	-	-	-	1	260
Health care extenders	1,738	450	1,173	-	43	2	7	63
Other health care providers	1,404	610	633	32	23	23	20	63
Nutritionists, dietitians	918	576	128	-	106	-	30	78
Social workers	1,556	741	490	-	244	-	30	51
Health educators	457	325	44	12	12	-	52	12
Behavioral scientists (including psychologists)	634	365	236	-	3	-	2	28
Clinical laboratory, biological medical technologists, and related occupations	4,778	469	1,120	333	26	2,623	16	191
Engineers, sanitarians, and related occupations	5,757	1,251	190	3,902	289	14	58	53
Planners, DP programmers and analysts, statisticians, and related occupations	1,631	221	40	57	709	12	516	76
Lawyers, hearing officers and related occupations	193	16	-	12	18	1	146	-
Administrative and managerial occupations	3,969	1,346	437	316	749	156	810	155
Other professional, administrative and technical occupations	8,353	2,935	857	1,305	1,258	664	1,092	242

1/ The following SHAs did not report to the ASTHO Foundation in 1982 and are not included in this table: California, Guam, Maine, Montana, New Mexico, Northern Mariana Islands, Ohio, Oregon, South Dakota and the Trust Territory. The District of Columbia, Florida, Maryland and Mississippi are also excluded from the table. SHAs in the District of Columbia and Maryland did not report staffing data by program area and occupation in 1982. SHAs in Florida and Mississippi did not report information on staffing by program area.

SOURCE: Association of State and Territorial Health Officials Foundation. Staffs of State Health Agencies, April 1985, (Performed under Purchase Order No. HRSA 84-206, Health Resources and Services Administration).

Table 11-2. TRENDS IN STAFFING OF STATE HEALTH AGENCIES, BY PROGRAM AREA, 1977 TO 1982 [1]

Program area	1977	1979	1980	1982	Percentage Change 1977-1982
	(number of employees)				
Noninstitutional personal health	19,178	22,108	20,229	20,679	7.8
SHA-operated institutions	13,025	13,533	13,410	11,523	-11.5
Environmental health	6,891	6,436	6,200	6,329	- 8.2
Health resources	5,761	5,277	5,100	4,373	- 2.4
Laboratory	3,355	3,374	3,277	3,124	- 6.9
General administration	4,260	4,350	4,506	4,205	- 1.3
Not identifiable by program area	937	699	1,756	1,713	82.8

[1] Thirty-eight SHAs reported comparable data by program area for the period 1977-1982. SHAs not included in the analysis were California, District of Columbia, Florida, Guam, Maine, Maryland, Massachusetts, Mississippi, Montana, New Mexico, New York, the Northern Mariana Islands, Ohio, Oregon, Puerto Rico, South Dakota, Tennessee, the Trust Territory, and West Virginia.

SOURCE: Association of State and Territorial Health Officials Foundation. Staffs of State Health Agencies, April 1985.

Table 11-3. TRENDS IN STAFFING OF STATE HEALTH AGENCIES, BY OCCUPATION: 1977 TO 1982

Occupation	1977	1979	1980	1982	Percentage Change 1977-1982
Physicians	2,979	3,404	3,085	2,309	-22.5
Dentists	550	700	553	503	- 8.6
Registered nurses 1/	12,631	14,810	13,483	12,984	2.8
Licensed practical nurses 1/	3,850	3,704	4,068	3,806	- 1.1
Nutritionists, dietitians	718	1,312	911	1,034	44.0
Social workers	1,705	1,862	1,563	1,505	-11.7
Health educators	546	551	472	491	-10.1
Laboratory technologists and related occupations	4,868	5,001	5,021	4,701	- 3.4
Engineers and sanitarians	7,116	7,436	6,408	6,384	-10.3
Planners, programmers, analysts, statisticians	1,094	1,647	1,681	1,632	49.2
Other professional and technical employees 2/	15,419	16,694	16,021	15,424	0.0
All other	36,715	38,942	37,278	34,670	- 5.6

1/ Forty-three SHAs reported comparable data for 1980 and 1982. In Virginia, licensed practical nurses and registered nurses were combined to form one category; Virginia was therefore excluded from the comparison of these two occupations.

2/ In 1982, health care extenders, behaborial scientists, veterinarians, lawyers other health care providers, and administrative and managerial occupations were listed as separate categories. In previous years, these occupations were not listed separately. For purposes of this comparison, employees in these occupational categories have been included under "Other professional and technical employees."

SOURCE: Association of State and Territorial Health Officials Foundation. Staffs of State Health Agencies, April 1985.

Table 11-4. MEDIAN SALARIES FOR VARIOUS HEALTH PROFESSIONS

PROFESSION	Highest 1%	25th Percentile	Median	75th Percentile	Lowest 1%*
			Thousand of dollars		
Health Administrator	$60	$32	$26	$21	$ 9
Health Educator	39	22	18	15	11
Laboratory Technician	30	20	15	13	6
Public Health Nurse	28	18	16	14	8
Public Health Physician	76	56	48	42	12
Sanitarian	27	19	17	15	10

*Includes Part-time Personnel

Source: American Public Health Association. Survey of Employee Compensation Local Health Departments United States - 1982.

Table 11-5. ACTUAL APPROPRIATIONS FOR PUBLIC HEALTH AND HEALTH ADMINISTRATION TRAINING, BY TYPE OF SUPPORT, FISCAL YEARS 1957 TO 1984

Fiscal year	Institutional support[1]		Traineeships[2]		Projects[3]
	Schools of public health	Health admin. programs	Public health	Health admin.	
		Thousands of dollars			
1957.........	-	-	$1,000	-	-
1958.........	-	-	2,000	-	-
1959.........	$ 450	-	2,000	-	-
1960.........	1,000	-	2,000	-	-
1961.........	1,000	-	2,000	-	$1,430
1962.........	1,173	-	2,000	-	2,000
1963.........	1,900	-	4,000	-	2,000
1964.........	1,900	-	4,195	-	2,000
1965.........	2,500	-	4,500	-	2,500
1966.........	3,500	-	7,000	-	4,000
1967.........	3,750	-	8,000	-	5,000
1968.........	4,000	-	8,000	-	4,500
1969.........	4,554	-	8,000	-	4,917
1970.........	5,154	-	8,000	-	4,917
1971.........	5,054	-	8,400	-	4,517
1972.........	5,554	-	8,400	-	4,517
1973.........	6,000	-	9,600	-	6,000
1974.........	5,700	-	9,120	-	5,700
1975.........	5,900	-	9,120	-	5,500
1976.........	5,900	-	9,120	-	5,500
1977.........	5,900	-	9,120	-	5,500
1978.........	5,900	$3,000	7,000	$1,500	5,000
1979.........	5,900	3,000	7,000	2,000	5,000
1980.........	6,450	3,000	7,000	2,000	5,000
1981.........	4,307	750	6,750	750	2,800
1982.........	4,176	1,440	2,880	480	-
1983.........	4,176	1,440	2,500	480	-
1984.........	4,838	1,440	2,569	480	-

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[1] Under P.L. 94-484 authorities beginning in FY 1978, schools of public health received capitation grants under section 770 PHS Act. Health administration programs received funds under section 791 of the Act.

[2] Under P.L. 94-484 authorities beginning in FY 1978, schools of public health and other eligible entities received public health traineeship grants under section 748 of the PHS Act. Other graduate health administration programs received funds under section 749 of the Act. Effective August 13, 1981, under P.L. 97-37, sections 748 and 749 were redesignated as sections 792 and 791A, respectively.

[3] Under P.L. 94-484 authorities beginning in FY 1978, schools of public health and other eligible institutions including graduate programs in health administration received funds under section 792 of the PHS Act. Effective August 13, 1981, under P.L. 97-37, section 792 was repealed.

SOURCE: Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, 1984.

Table 11-6. GRANT SUPPORT FOR GRADUATE EDUCATION IN HEALTH SERVICES ADMINISTRATION UNDER P.L. 94-484, BY TYPE OF SUPPORT, NUMBER OF GRANTS AND FUNDS AWARDED, FISCAL YEARS 1978 TO 1984

Type of support	1978		1979		1980		1981		1982		1983		1984	
	Grants	Funds	Grants	Funds	Grants	Funds	Grants	Funds	Grants	Funds	Grants	Funds	Grants	Funds
	Dollars in thousands													
Public health special projects[1]	32	$2,025	42	$2,123	46	$2,220	22	$1,321	-	-	-	-	-	-
Administration & management	18	1,423	22	1,405	26	1,287	15	913	-	-	-	-	-	-
Health planning or policy analysis	14	601	20	718	20	933	7	407	-	-	-	-	-	-
Grants to graduate programs (institutional support)[2]	22	2,970	24	2,970	23	2,970	22	742	24	1,426	28	1,426	29	1,426
Health administration traineeships[3]	21	1,485	25	1,980	25	1,980	27	742	28	475	30	476	32	475
Public health traineeships[4]	20	*	21	*	21	*	21	*	23	*	23	*	23	*

NOTE: Totals may not add exactly due to rounding.

[1] Section 792, PHS Act (which was repealed after FY 1981). Projects awarded under this section for health services administration. Subtotals refer to projects that appeared primarily devoted to planning and analysis or to management and administration. Many projects combined such activities in varying degrees.

[2] Section 791, PHS Act.

[3] Section 749, PHS Act. Effective 8/13/81, redesignated as Section 791A. Estimated numbers of trainees: 429 in FY 1978, 529 in FY 1979, 568 in FY 1980, 371 in FY 1981, 260 in FY 1982, 288 in FY 1983, and 275 in FY 1984.

[4] Section 748, PHS Act. Effective 8/13/82, redesignated as Section 792. Information not available on dollars devoted to trainees in health administration. However, estimated numbers of trainees in health administration are available: 917 in FY 1978, 874 in FY 1979, 864 in FY 1980, 870 in FY 1981, 626 in FY 1982, 476 in FY 1983, and 466 in FY 1984. Except in FY 1981, all schools receiving grants had trainees in health administration.

SOURCE: Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, 1984.

Table 11-7. PUBLIC HEALTH AND HEALTH ADMINISTRATION TRAINEESHIP GRANTS: FUNDS AWARDED, NUMBER OF STUDENTS SUPPORTED, AND AVERAGE AMOUNT OF AWARD PER STUDENT, FISCAL YEAR 1984

Type of grant	Funds awarded	Number of students supported	Average award per student
Public health traineeships[1]......	$2,543,000[2]	1,439	$ 1,768
Health administration traineeships[3]..................	$ 475,000[2]	356	$ 1,334

[1] Authorized by section 792, Public Health Service Act

[2] Amount remaining after evaluation tap.

[3] Authorized by section 791A, PHS Act.

SOURCE: Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, 1985.

Table 11-8. STUDENTS RECEIVING PUBLIC HEALTH TRAINEESHIPS,[1] BY AREA OF SPECIALIZATION, FISCAL YEARS 1978 TO 1984

Area of specialization	Number of students						
	1978	1979	1980	1981	1982	1983	1984
All specializations..........	2,175	2,250	2,211	2,120	1,517	1,292	1,439
Environmental & occupational health............	266	300	280	297	224	172	189
Measurement & research sciences..	384	209	430	389	266	245	253
Biostatistics..................	*	138	138	129	80	72	78
Epidemiology...................	*	271	292	260	186	173	175
Public health practice & program management...........	170	451	480	461	332	286	322
Nutrition......................	154	187	173	136	81	81	86
Maternal & child health........	**	56	85	87	87	83	87
Residencies in preventive medicine.....................	16 [2]	28 [3]	36 [3]	74 [3]	14 [3]	6 [3]	2 [3]
Residencies in dental public health................	*	4 [3]	11 [3]	7 [3]	2 [3]	0 [3]	0 [3]
Other dental public health.....	**	12	8	4	4	2	4
Health education...............	**	164	130	125	116	94	138
Laboratory.....................	**	**	38	28	28	20	5
Health services administration...	917	874	864	870	626	476	567
Other or unknown.................	438	216	156	103	69	113	108

NOTES: * Indicates information not available for this category, although included in totals and subtotals. ** Indicates students in these disciplines are counted in "other or unknown" category.

[1] Includes formula-type grants to schools of public health, competitive grants to other institutions, and residency traineeship grants, funded from FY 1978 through 1981 under section 748 of the PHS Act and in FY 1982 under redesignated section 792.

[2] Includes 9 residents in preventive medicine and dental public health receiving full support under residency grants, and 7 residents in these disciplines receiving partial support under formula-type grants.

[3] Includes residents receiving full support under residency grants and partial support under formula-type grants, as follows:

	Preventive Medicine		Dental Public Health	
	Full Support	Partial Support	Full Support	Partial Support
FY 1979	5	23	2	2
FY 1980	15	21	6	5
FY 1981	17	57	5	2
FY 1982	5	24	3	1
FY 1983	0	6	0	0
FY 1984	0	2	0	0

SOURCE: Division of Associated and Dental Health Professions, Bureau of Health Professions, Health Resources and Services Administration, 1985.

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Chapter 12

ALLIED HEALTH

Introduction

Defined very broadly, allied health could include all health-related occupations outside of allopathic and osteopathic medicine, nursing, dentistry, pharmacy, podiatry, optometry, and public health. In 1982 the Commission on Allied Health Education Accreditation (CAHEA) estimated that such a definition would encompass 63 percent of the health care work force (approximately 3.8 million workers practicing in more than 100 occupations) and more than 8,000 educational programs in institutions of higher education (DHEW, 1979).

The allied health professions, as defined in Title VII of the Public Health Service Act, include, "...individuals with training and responsibilities for supporting, complementing, or supplementing the professional functions of physicians, dentists, and other health professionals in the delivery of health care to patients...." (Sec. 795, PHS Act as amended 1982). For program and educational assistance purposes, previous reports by the Department narrow this broad definition into specific groups of allied health occupations receiving professional training at the collegiate level and providing specialized services with a significant impact on health care. Under this more restricted definition of allied health personnel, it is estimated that there were 1.235 million allied health personnel in 1984; up 13 percent from the estimated 1.091 million in 1982 (Table 12-1). This chapter uses such an operational definition and addresses the following key allied health occupational groups not addressed elsewhere in this report.

- **Clinical laboratory** -- including medical technologists cytotechnologists, and medical laboratory technicians.
- **Dietetics** -- including dietitians, dietetic technicians, and dietitian assistants.
- **Medical records** -- including medical record administrators and technicians.
- **Occupational therapy** -- including occupational therapy assistants.
- **Physical therapy** -- including physical therapy assistants.
- **Radiologic technology** -- including radiographers, nuclear medicine, and radiation therapy technologists.
- **Respiratory therapy** -- including respiratory therapy assistants.
- **Speech-language-hearing** -- including speech-language pathologists and audiologists.

Some other allied health professions are discussed in chapters on professions with which they are closely linked (e.g., dental assistants and hygienists, nurses aides, and physicians assistants).

This list obviously does not include many other health professionals practicing in the health delivery system and most notably excludes scientists, biomedical researchers, social workers, emergency service workers, and many of the rehabilitative occupations. Even with these exclusions, the roles of allied health professionals range across the entire spectrum of service delivery and are vital to the provision of quality health care. From the clinical laboratory and radiologic technologist for diagnostic evaluation, to various therapists and dietitians for rehabilitation, through the medical records administrator and technician for history documentation and billing, each professional applies unique skills and training to comprehensive patient care. And yet, the allied health professional is probably the least publicly visible member of the health care team.

Some allied health occupations were recognized before 1900, for example, medical librarian (now known as medical records administrator), dental assistant, and dietitian (NCAHE 1980). With the rapid development of new medical technologies since 1940, more discrete allied health professions emerged and continue to do so. Some examples of the newer professions are: radiologic technicians, who administer a number of nuclear tests; sonographers, who use ultrasound equipment for diagnostic evaluations; and perfusionists, who operate kidney dialysis and heart monitoring equipment. Rapid technological developments require many allied health professionals to learn new skills and keep abreast of new technologies, and in some cases to further specialize.

With the increase in the number of recognized allied health professions, the roles of many professionals also changed. In the early 1900s allied health professionals acted exclusively in support roles for other health professionals who trained them on the job to carry out the more routine procedures. Today, education programs are more formalized with clinical practicums being only a part of the overall curricula. Many allied health professionals now practice independently, such as dietitians, physical therapists, and speech-language pathologists/audiologists; in independent groups, such as clinical laboratory technicians; or in joint practice with other health professionals, such as physical and occupational therapists with physicians and dental hygienists with dentists. From these diverse roles it follows that the work settings for these professionals are also varied, including hospitals, clinics, private offices, mobile medical emergency units, and independent laboratories.

While such diversity meets the ongoing needs of the health care community, it is difficult to make generalizations and data assessments about the allied health occupations as a group. Confounding the picture is the fact that each profession requires differing educational levels for entry, some demanding extensive clinical experience prior to beginning practice, ranging from limited postsecondary training to doctoral study. Allied health education programs are located in univerisities (both within health science centers and independently), associate degree and 4-year colleges, postsecondary technical schools, and hospitals. Slightly over half of the programs are located in 4-year colleges and universities.

A 1984 report by the American Society of Allied Health Professions, "A Plan for a Cooperative Allied Health Information System", discusses the difficulty of analyzing the allied health occupations as a group and provides the following reasons:

- Adequate data on allied health manpower are not available.
- There is no central source that provides comprehensive data on the allied health professions.
- Although information on the variety of current data bases is available, it is often hard to obtain.
- Data are generally not compatible; they vary in reliability and consistency.

Additional reasons for the dearth of usable data on allied health professions include:

- **Definition**. Although allied health professions has been defined for the porposes of this report, there is no universal definition accepted by data collection sources.
- **Professional Associations**. No one professional association speaks for allied health as a group, although the American Society of Allied Health Professions, established in 1968, has attempted to bring the professions together under one organizational umbrella. Because each profession has at least one association of varying membership strength and data collection activity, information availability and reliability vary widely.
- **Education Program Accreditation**. The American Medical Association's Committee on Allied Health Education and Accreditation (CAHEA) collects enrollment and graduate data for programs in all settings, including 4-year colleges and universities, junior and community colleges, hospitals, clinics, military programs, and others. Not all allied health education programs are accredited by CAHEA, however. The most notable exclusions are physical therapists, dietitians, and speech-language-hearing pathologists and audiologists, who maintain their own accrediting bodies.
- **Certification/Licensure**. Each profession has certification standards and procedures for their practicing professionals. The adherence to and standards for certification vary among professions and employers. States also vary in their

professional licensure requirements, if they license the profession at all. Together these factors severely limit another important source of data.

- **Requirements/Demand Projections.** While models for projecting physician and nursing requirements are based on a number of factors including population demographics, financial factors such as third-party reimbursement patterns, and changes in medical technology and health care delivery, requirements projections for allied health occupations are more likely to be based on expert opinion, subjective data, and hospital vacancy rates.

Some data used in this chapter are based on surveys conducted by accrediting bodies, professional associations, and the American Hospital Association. The reports most frequently cited are:

- Allied Health Education Fact Sheet, February 1985. This report, published annually by CAHEA, includes statistical data submitted by accredited programs in the 1983 and 1984 Annual Reports as well as information contained in CAHEA program files through 1984.

- "Report of CAHEA Surveys: Impact of PPS on Clinical Education and Perspectives of Program Directors", Allied Health Education Newsletter, December 1984. This report presents the results of a survey of 2,850 directors of CAHEA-accredited education programs, with a return of 81 percent or 1,944 responses analyzed by occupation.

- 1984 American Hospital Association Annual Survey of Hospitals. This survey was sent to 6,888 registered hospitals to accumulate data on hospital employment and vacancy rates.

- An In-Depth Examination of the 1980 Decennial Census Employment Data for Health Occupations, Executive Summary, ODAM Report No. 17-84, DHHS, 1984. ~~This~~ study analyzed the demographic data collected on various health professionals by the 1980 Decennial Census, adjusted for such variables as inconsistent educational levels. (These data must be viewed cautiously because an accurate data base for comparison is lacking.)

With these limitations, this chapter addresses individually the current status of each of the previously indicated health professions. These status assessments are based on the data available from a number of sources and include education programs and students, supply and requirements, licensure and certification, and issues considered important to a particular occupation. The summary provides general conclusions about the current status of the allied health professions, including the anticipated impact of new reimbursement methods such as Medicare's Prospective Payment System.

Clinical Laboratory

Clinical laboratory techonologies and sciences occupy an increasingly vital place in the detection, diagnosis, and treatment of illness. Teams of pathologists, specialists, technologists, technicians, and assistants work together to determine the presence, extent, or absence of disease and provide data needed to evaluate the effectiveness of treatment. Individuals employed in clinical laboratories have varied levels and types of functions and degrees of specialization. Educational preparation can range from a one-year program in a hospital to a Ph.D. degree and postdoctoral study. There are approximately 12,000 clinical laboratories, including those in federally regulated hospitals, independent commercial laboratories, and group practices. Clinical testing is also performed in doctors' offices, rural health clinics, nursing homes, psychiatric and mental retardation institutions, the criminal justice sytem, and even in homes. The estimated number of personnel involved in clinical laboratory services increased from 30,000 in 1950 to approximately 278,000 in 1984.

Medical Technologists. Medical technologists represent slightly more than half of all allied health personnel active in clinical laboratory services (AHA 1983, DHEW 1979). Medical technologists are highly skilled laboratory scientists with a strong generalist orientation who perform or supervise tests and procedures in hematology, bacteriology, serology, immunology, clinical chemistry, blood banking, urinalysis, mycology, and parasitology. In addition, there are other technologists who specialize in certain areas: clinical chemistry technologists determine the presence and quantity of chemical substances in the blood and other body fluids; hematology technologists perform tests for clotting factors and study blood cells to facilitate diagnosis of illness; microbiology technologists identify bacteria, fungi, parasites, and other pathogenic organisms present in the human body; and blood bank technologists perform a large array of transfusion services.

Cytotechnologists. Cytotechnologists detect the presence of cellular disease through microscopic examination of cell samples, mainly from certain biopsy techniques and Papanicolaou smears. In 1984, there were approximately 8,000 cytotechnologists. According to a study by the National Commission on Allied Health Education (NCAHE), 60 percent worked in hospitals, over 30 percent worked in independent laboratories, and only 5 percent were employed in private or group practice (Holmstrom, 1980).

Medical Laboratory Technicians. Medical laboratory technicians perform routine clinical laboratory tests under the supervision of a medical technologist, laboratory supervisor, or clinical laboratory scientist. In 1984, there were about 15,000 medical laboratory technicians (DHHS 1984). In addition, approximately 93,000 unspecified other workers performed various functions in clinical laboratory settings.

Students and Institutions

In 1984, CAHEA accredited 1,018 programs in cytotechnology, medical laboratory technology (including technician associate degree and certificate programs), and blood bank technology. These programs had a 1983-84 enrollment of 17,952 full- and part-time students and produced 9,719 graduates. Medical technology represented the greatest number of programs (615), students (8,883), and graduates (5,370) in the clinical laboratory field. The number of graduates for medical technologists was above 6,000 for a number of years but seems to have stabilized at the lower level, near 5,000, over the past 3 years. There were 278 medical laboratory technician programs accredited by CAHEA in 1983-84 with nearly 4,000 graduates and 8,600 enrollees, considerably more than in the early 1970s. In comparison, cytotechnology programs in 1973 enrolled 436 students and graduated 355, compared to 318 students and 233 graduates from 61 programs in 1983-84.

The 1984 CAHEA survey of program directors indicated that between 1981 and 1984 only cytotechnology programs showed any increase in entering students. Between 78 percent and 89 percent of responding program directors, other than cytotechnology program directors, indicated that student enrollments were either stable or decreasing within their occupational areas.

Supply and Requirements

A 1983 American Hospital Association (AHA) survey indicates that over 163,000 full-time-equivalent (FTE) medical laboratory personnel were employed in 6,888 U.S. registered hospitals. About 55 percent of these were medical technologists. The 1980 Decennial Census identified 247,800 individuals indicating employment as clinical laboratory technologists and technicians without regard to setting. A survey of professional associations conducted by the NCAHE in 1979 found that over half of all medical laboratory technologists/technicians were employed in hospitals, another 14 percent in other health care settings such as comprehensive health care centers or clinics, over 10 percent in private or group practice offices, 7 percent in private laboratories, and 16 percent in other health agencies (Holmstrom, 1980). A comparison of the AHA data with these earlier findings suggests no major shift in the proportion of medical technologists and technicians employed in hospitals in the past few years. The 1983 vacancy rate as reported by AHA was slightly over 2 percent for medical technologists and 1.8 percent for all other laboratory personnel. The American Society of Clinical Pathologists/College of American Pathologists conducted surveys of participants at their 1983 and 1984 autumn meetings. Of the 764 respondents, 62 percent were pathologists and 38 percent were technologists, clinical scientists, or laboratory personnel. These respondents were questioned on observed changes in staffing patterns in their laboratories over the 6-month period prior to completion of each of the questionnaires in 1983 and 1984. The study compared the percentage of respondents reporting decreases in staffing positions in 1984 as compared to 25 percent in 1983; for technician positions, 29.9 percent of the respondents reported decreases as compared to 18.1 percent in 1983. Similarly, CAHEA's 1984 survey of program directors indicated that in 1981 between 90 percent and 98 percent considered the occupation to be either undersupplied or in balance with graduates while in 1984 only 54 percent to 29 percent held the same belief (excluding cytotechnology which fell from only 93 percent to 75 percent and specialists in blood bank technology which fell from 86 percent to 80 percent for the same variable).

Licensure and Credentialing

The American Society of Clinical Pathologists (ASCP) conducted a survey of State licensure requirements through a questionnaire sent to all 50 State health laboratory department directors in 1984. Although all States have some type of personnel standards regulation or classification system, only New York City and five States (California, Florida, Hawaii, Nevada, and Tennessee) have legislated licensure requirements for all laboratory personnel (with some exceptions at the technician level). Almost every State reported some legislative effort toward licensure. Because only a limited number of States require licensure, certification by professional associations is an important method for standard setting within the field.

The Department of Health and Human Services periodically administers a Proficiency Examination, which does not provide a credential but rather qualifies individuals to work as clinical laboratory technologists in Medicare-certified independent laboratories. There is some evidence that employers and clinical laboratory personnel are interpreting successful completion of this examination as certification. This is corroborated by the fact that only 14 percent of those individuals taking the last administered examination indicated that their place of employment was an independent laboratory, the only employment setting for which this qualification should be meaningful.

The major certifying bodies in the clinical laboratory field are the Board of Registry of the American Society of Clinical Pathologists (ASCP), which maintains the largest certification agency with 186,259 certificants, mostly technologists at or above the baccalaurate level seeking the ASCP(MT) credential; the American Board of Bioanalysis, which has 1,000 certificants, primarily nonphysician laboratory directors possessing doctoral degrees; the International Society for Clinical Laboratory Technology, which has 6,000 certificants mainly at the technician level; the American Medical Technologists, which has 9,451 certificants, most with formal education below the bachelor's level who work as technicians; and the National Certification Agency (NCA) which has 32,335 certificants in the technician and scientist classification with a minimum of a B.S. degree.

Issues

As indicated previously, one of the key issues in the laboratory field is licensing and credentialing. States that have not passed proposed licensure legislation seem unlikely to do so. Current certification bodies confer a variety of certificates, some with similar titles but with different requirements. The number of laboratory workers trained on-the-job who do not meet existing credentialing requirements cannot be determined. Differences in credentialing requirements cause confusion in the work setting and make the assessment of employment demand in terms of qualifications and skills very difficult.

Another concern, common to all the allied health occupations but which may have an immediate impact on laboratory personnel, is the prospective payment system (PPS) for hospitals as established by the Social Security Amendments of 1983. Under PPS, laboratory services no longer appear as a separate billing item for Medicare patients but are contained in the allowable cost for each patient based on the appropriate diagnosis-related group (DRG). Hospitals, faced with declining in-patient days, are attempting to reduce personnel expenditures, which has affected nonphysician laboratory personnel through reductions in staff, decreases in overall work volume, increases in preadmission and postdischarge testing, and restructuring of hospital laboratories to serve nonhospital patients. There have also been indications of nursing staff being used to perform some bedside laboratory functions (Musgrave, 1984).

The Deficit Reduction Act of 1984 established a fee schedule for services in independent, hospital, outpatient, and physician office laboratories. The regulations are not yet implemented, but essentially the fee schedule will reduce the amount paid to laboratories for the tests they perform and may result in a reduction in numbers of laboratories and employees.

Dietetics

Dieticians are health professionals trained in nutrition and institutional management whose responsibilities are directed toward the adequate nutritional care of individuals and groups in both institutional and community settings. Dietitians function mainly in adminisrative, clinical, community, research, or education positions. Dietetic technicians assist dietitians by functioning as middle management and service personnel in various health care facilities while dietary aides perform routine nontechnical food preparation and service.

Students and Institutions

The U.S. Department of Education recognizes the Commission on Accreditation (COA), the autonomous credentialing component of the American Dietetic Association (ADA), as the accrediting agency for dietetic education programs. The programs accredited are coordinated undergraduate programs in dietitics, those that combine didactic and clinical experience within a 4-year baccalaureate program, and postbaccalaureate dietetic internships. The COA also has a Dietetic Technician Committee which approves competency-based programs in dietetic education. These are known as Plan IV programs and meet the academic component of eligibility requirements to take the registration examination. In 1984, ADA reported that the COA accredited 66 coordinated undergraduate B.S. programs which accept approximately 914 students each year, 106 dietetic internships which accept approximately 900 Plan IV graduates each year, 272 Plan IV programs with 2,958 graduates in 1983-84, and 80 dietetic technician programs with approximately 650 students. Because there are only enough internships to accomodate approximately a third of the Plan IV graduates each year, many seek alternative means of attaining the requirements of the registry examination. Apparently the majority of students take the graduate degree approach. Although the ADA neither accredits nor approves graduate degree programs in dietetics, the 1985 Directory of Dietetic Programs lists 152 such programs in universities around the country, 51 with Ph.D. programs and three with Ed.D. programs.

Supply and Requirements

In 1985, the American Dietetic Association (ADA) reports 39,980 registered dietitian members (mostly clinicians). The adjusted 1980 Decennial Census reported 32,500 individuals indicating employment as dietitians. The larger number of registered persons over those employed probably reflects the fact that some dietitians retain registration even though not employed. ADA's 1984 data report on dietitian members indicates that about 35 percent work in hospitals, 19 percent in nursing homes, 11 percent in educational institutions, 6 percent in ambulatory clinics, and 2 percent in Health Maintenance Organizations (HMO). Similarly, the 1983 AHA survey identified 34 percent of the 42,000 FTE dietetic service workers employed in hospitals as dietitians. In contrast, CAHEA reported that 80 percent of all dietetic technicians worked in hospitals, 15 percent in nursing and rest homes, and the remainder in other health care settings. Nursing and rest homes employed nearly two-thirds of all dietetic assistants, with the remainder working in hospitals (Holmstrom, 1980). It is clear from these data that hospitals tend to employ more dietetic technicians and assistants than dietitians.

More than half of the practicing dietitians are recent graduates with fewer than 2 years experience in the field. While a majority of dietitians have only a baccalaureate degree, recent graduates are more likely to have a master's or higher degree. Fewer than 3 percent of the practicing dietitians are men, and less than 13 percent are minorities, mostly Asians and Blacks.

The 1983 AHA survey showed a 2.1 percent vacancy rate for dietitians and 1 percent for dietetic technicians. The American Dietetic Association conducted a 2-year survey beginning in 1979 titled the Dietetic Manpower Demand Study (DMDS), which was based on a professional judgement approach with demand estimates developed through the implementation of a Delphi process. This study projected a probable scenario for 1985 and 1990 upon which demand estimates were derived. The study showed demand increasing very slightly for dietetic services with most employment settings remaining stable. The total number of employed dietitians, however, was projected to grow slowly and steadily until 1990 with the number of part-time workers remaining high. In the largest employment setting, hospitals, projected demand will increase by 3,600 positions in 1990 from the 1981 baseline estimates to a total of 21,400. All other settings will remain the same with a possible decrease in demand for dietitians in higher education in the 1980s.

Credentialing and Licensure

ADA reports that four States currently have licensing legislation for dietitians. Georgia and Texas have voluntary acts that protect the titles of "licensed dietitian" and "registered dietitian" and are regulated by State boards. Oklahoma and Puerto Rico have mandatory acts that protect the scope of practice of nutrition and dietetics. Four other States have title acts that protect the titles of "Dietitian" and "R.D." (Alabama, California, Louisiana, and Montana). ADA estimates that 90 percent of the remaining States are currently looking into some form of licensing for dietitians.

The Commission on Dietetic Registration (CDR) is the autonomous certifying component of the ADA. Dietitians who meet the standards and qualifications established by the CDR may be registered and may use the professional designation "registered dietitian" or the initials "R.D.". Requirements to take the R.D. examination include completion of ADA academic requirements and a baccalaureate or higher degree; completion of one of the available accredited experience options, a coordinated undergraduate program or dietetic internship, an approved 3-year preplanned work experience, or an advanced degree in nutrition or related areas with 6 months full-time or equivalent qualifying experience; and confirmation of completion of experience and academic requirements by verification. To maintain registered status, each registered dietitian must accumulate 75 hours of approved continuing education over a 5-year period and pay an annual registration maintenance fee. In 1985, the ADA reports 39,980 currently registered dietitians.

Issues

One of the primary concerns of dietitians is getting proper dietary services and nutrition information to the public. One way dietitians through the ADA are pursuing this goal is by encouraging the passage of State licensure legislation to prevent unqualified individuals from holding themselves out to the public as "dietetic counselors" or "nutritional specialists". Another concern of dietitians is the role of nutrition in health promotion and disease prevention, particularly for children and expectant mothers.

Medical Records

The two levels of personnel in the field of medical records are medical record administrators and medical record technicians. The medical record administrator is responsible for the management of health information systems consistent with the medical, administrative, ethical, and legal requirements of the health care delivery system. Medical record administrators are involved in the patient care evaluation process, working with other medical staff to develop criteria, compile statistics, and conduct medical audits. The medical record technician serves as a specially trained, skilled technical assistant to the Registered Record Administrator, carrying out the many technical activities within a medical record department -- typing medical reports, preparing statistical reports on patients treated, supervising clerical personnel, reviewing medical records for completeness, and working with other health professionals on medical records and medical research projects. In addition to medical record administrators and technicians, there are a wide range of support personnel, including transcriptionists, file clerks, and ward clerks, for which there are no reliable supply figures. Managing an information system that meets the medical, administrative, ethical and legal requirements of a health care delivery system involves the teamwork of all medical record personnel. Medical records personnel are a major link in the new Medicare Prospective Payment System, maintaining a complicated coding and record system for billing the Medicaid fund based on Diagnostic Related Groups.

Students and Institutions

In 1983-84, CAHEA accredited 55 programs for medical record administrators with total enrollments of 1,819 students and 834 graduates; and 86 programs for medical record technicians with total enrollments of 3,210 students and 890 graduates. Enrollments and graduates in medical record administrator programs have almost doubled since 1973-74, but enrollments were down from 2,307 in 1980-81 to 1,819 for 1983-84.

Supply and Requirements

Data from a recent survey reported by the American Medical Records Association (AMRA) show that the estimated number of medical record personnel grew steadily over the past three decades, from 12,000 in 1950 to 87,000 in 1984. Medical record administrators represent 17 percent of this 1984 total figure. Similarly, the 1983 AHA data report shows that of the 44,800 FTE medical records personnel employed in hospitals, 16 percent were medical record administrators. These figures tend to indicate that more than half of the total medical records work force is employed outside of hospitals. These employment settings include outpatient clinics, ambulatory care centers, health maintenance organizations, nursing homes, professional standards review organizations, government entities, insurance agencies, universities, colleges, and research centers.

The profile of the medical records field obtained by the AMRA Membership Survey shows a work force with almost one-half of the active supply at 35 years of age or under, slightly more than 3 percent male members, slightly more than 6 percent minority representation, less than 15 years in practice (a vast majority with less than 10 years in practice), over 10 percent holding or working toward a master's degree, and 31 percent holding a bachelor's degree and 12 percent working toward that degree.

In 1983 AHA reported a 2 percent vacancy rate for all medical record personnel, but there was some indication that the demand for medical record administrators was slightly higher than for medical record technicians. There is much speculation about a future increased need for medical records personnel in hospitals now that Prospective Payment Systems require careful coding and tracking of hospital treatment procedures and the potential for expansion of PPS to other types of health care settings. CAHEA's 1984 survey indicated that in 1981, 96 percent of the medical records administrator program directors considered the occupation to be either undersupplied or in balance with graduates; in 1984, however, the proportion of program directors holding that view had dropped to 85 percent (13 percent shifted to considering the occupation as fluctuating; no respondents thought so in 1981). There was a similar shift among medical records technicians program directors, with 96 percent considering the occupation to be undersupplied or in balance with graduates in 1981 compared to 91 percent in 1984 (9 percent shifted to considering the occupation fluctuating; no respondents thought so in 1981).

Licensure and Credentialing

No State licenses medical records personnel. The Council on Certification of the American Medical Records Association administers examinations for accreditation and assurance of competency within the occupation. To take the Registered Record Administrators (RRA) examination, an individual must be a graduate of a CAHEA-accredited baccalaureate degree program or a college graduate from any field that meets the prerequisites, and must have completed an accredited postgraduate certificate program in medical records administration. To take the Accredited Record Technician (ART) examination an individual must complete either a 2-year CAHEA-accredited academic program leading to an associate degree or the Independent Study Program in Medical Record Technology offered by AMRA.

Issues

Medical records administrators are concerned with maintaining the confidentialty of patient records. They are also concerned with the changing role of hospitals' medical records staff with the advent of PPS and new diagnostic related groups that demand new training and an expanded range of education for the profession. AMRA sees no shortage of RRA's or ART's in the immediate future, but if PPS is expanded to extra-hospital settings short-term shortages could occur. AMRA is also working to maintain a high standard of professional performance by encouraging continuing education and by developing a competency-based assurance examination.

Occupational Therapy

Occupational therapy is a health and rehabilitation profession that provides services to persons of all ages who are physically, psychologically, or developmentally disabled, including those suffering from strokes, heart diseases, arthritis, diabetes, serious burns, spinal cord injuries, and psychiatric disorders. The profession tailors the rehabilitation process individually for each patient and, through evaluation and treatment, results in the restoration or improvement of impaired functions. Occupational therapy assists these patients in achieving a maximum level of independent living by developing the capacities that remain after disease, accident, or deformity.

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The two levels of personnel within the profession are occupational therapist and occupational therapy assistant. Occupational therapists are health professionals who work closely with other members of the rehabilitation health care team. Their functions range from diagnosis to treatment, including the design and construction of various special and self-help devices. Although there are no formally recognized areas of specialization for occupational therapists, individuals tend to work with certain types of disability and age groups. A decreasing number of therapists are working with patients of mixed ages. AOTA estimates that between 1977 and 1982 the percentage of therapists working with mixed age groups dropped from 43.9 to 20.5. Occupational therapy assistants work under the supervision of occupational therapists, participating in the treatment and rehabilitation of patients.

Students and Institutions

In 1984 CAHEA accredited 56 programs in occupational therapy with total student enrollments of 6,642. During the same year there were 1,665 graduates. Between academic years 1973-74 and 1981-82 CAHEA reported an increase of graduates from accredited occupational therapy programs of just over 100 percent. However, the graduate level fell from 2,400 in 1981-82 to 1,665 in 1983-84 despite no reduction in the number of accredited programs. According to AOTA, in 1977 there was a 51 percent excess of qualified applicants to occupational therapy programs, which dropped to 15 percent in 1981 with several programs not able to fill available spaces (Acquaviva and Presseller, 1981). In contrast, the 1984 CAHEA survey of program directors indicated that the percentage considering the numbers of entering students to be either stable or increasing went up from 79 percent in 1981 to 91 percent in 1984.

Supply and Requirements

In 1984 the American Occupational Therapy Association (AOTA) estimated that there were 30,000 registered occupational therapists, a strong increase from the estimated 7,000 in 1960. Using estimates of graduates and separations from the work force, the supply of occupational therapists is projected at 34,000 in 1987 and 37,000 in 1990.

Analysis of the 1982 AOTA membership survey indicated that 70.4 percent worked full-time (in contrast to 57.1 percent in 1973) and 16.7 percent worked part-time (in contrast to 14.6 percent in 1977). Information from the 1984 AOTA membership survey indicates that 25 percent or 7,500 occupational therapists worked in general hospitals. Similarly, 1983 AHA data showed about 12,500 FTE personnel employed as occupational therapy service workers in hospitals. Seventy percent of these were occupational therapists and 30 percent were assistants or aides. 1984 AOTA membership data show about 18 percent (5,500) were employed in school systems. This employment setting became particularly important after passage of the Education for All Handicapped Children Act of 1975 which required that occupational therapy services be available within school systems. Other leading employment settings for occupational therapists were rehabilitation hospitals (2,700), psychiatric hospitals (2,200), and nursing home facilities (1,800).

1984 AOTA membership data also indicates that approximately 1,500 or about 5 percent of the active supply were men and only 8 percent or 2,400 occupational therapists were members of minority groups. The proportion of male occupational therapists is projected to remain at the 1984 level through 1990 (Table 12-2). The median age of active occupational therapists was 31 years and more than 4 of 5 have baccalaureate degrees as the highest educational level. AHA reported a vacancy rate of 5.2 percent for occupational therapist positions and 4.2 percent for occupational therapy assistant positions in 1983. Occupational therapists vacancies were down from 6.9 percent in 1981 while occupational therapy assistant vacancies remained the same. In 1984 CAHEA survey of program directors indicated that no respondents considered the profession to be oversupplied while there was a shift from 96 percent in 1981 to 89 percent in 1984 considering the occupation to be undersupplied. Demand for occupational therapists is expected to remain high through 1990 due to increases in need for such services by an aging population and a leveling off of occupational therapy graduates as indicated in the section on Students and Institutions.

Certification and Licensure

Credentialing of occupational therapists involves voluntary registration processes and/or mandatory State licensure. Graduates from accredited schools of occupational therapy are eligible to take a national certification examination conducted by AOTA. Therapists who successfully complete the examination are entitled to use the credential designation OTR, become automatically certified, and are eligible to become members of the professional association. Presently, 30 States require licensure of occupational therapists with two States (California and Hawaii) having "trade-mark" bills governing those who represent themselves as occupational therapists. All the remaining States and the District of Columbia are in some stage of either drafting or considering licensure. Such a bill was passed by New Jersey's legislature in 1985 and is awaiting the Governor's signature.

Issues

Occupational therapists are concerned about shortages since positions continue to go unfilled and student enrollment seems to be declining. This may lead to other occupations assuming some of the functions currently carried out by occupational therapists. As with other formerly female-dominated professions, new opportunities for women in higher paying occupations such as medicine, business administration, and law might be a factor in declining enrollment.

AOTA does not expect PPS to be an issue within the profession. Results of a 1985 survey were published in AHA's June 1985 Hospitals and show that occupational therapy departments seem to be adapting to the new system. The survey was sent to 2,700 occupational therapy department directors in acute care hospitals, most of which were covered by PPS, and had a 39.9 percent response rate (1,044 usable responses). The survey shows that occupational therapists have responded to PPS information in the following ways: increased involvement in hospital discharges; flexible work schedules; group treatment methods; patient education; and home health referrals.

Physical Therapists

Physical therapy personnel provide preventive, diagnostic, and rehabilitative services aimed at the restoration of function and prevention of disability arising from disease, trauma, injury, loss of limb, or lack of use of a body part. Physical therapy is used in the treatment of neurological disorders, nerve or muscular injuries, chest conditions, amputations, fractures, burns, and arthritis. Various techniques are used, including exercise, massage, and application of heat, to reduce pain and enhance mobility and strength in joints and muscles. In addition to treating and assessing the progress of patients, physical therapy personnel work closely with patients' families and instruct family members in continued home treatment.

There are two levels of personnel -- physical therapists and physical therapy assistants. Physical therapists, upon referral from a physician, plan and administer treatment programs to assist patients in reaching maximum performance and functional levels. In addition to diagnosis and treatment in health care settings, physical therapists also serve as researchers and educators. The occupation title, physical therapy assistant, emerged in 1967 due to greater demand for physical therapy services than the supply of physical therapists at the time could provide. Physical therapy assistants work under the direct supervision of physical therapists, using a variety of treatment techniques. They work mainly with patients whose conditions are relatively stable.

Students and Institutions

As of April 1983 the American Physical Therapy Association's Commission of Accreditation in Education (APTA/CAE) was recognized as the sole accrediting agency for physical therapy and physical therapy assistant educational programs. In 1984, APTA/CAE accredited 107 total entry level physical therapy educational programs and 67 programs for physical therapy assistants in 1984, compared to 47 programs for physical therapist accredited in 1970.

In academic year 1982-83 there were 3,463 first-year enrollees in and 3,104 graduates from both baccalaureate and certificate programs (a 7.5 percent increase in graduates since 1979-80 and a 30.8 percent increase since 1976-77), 302 enrollees in entry level masters programs, and 829 physical therapy assistant graduates (a 37.2 percent increase since 1978-79). Although APTA does not accredit postprofessional education programs, the Association is aware of 26 graduate level programs for physical therapists.

Educational programs for physical therapists have one of the lowest acceptance rates of all collegiate allied health programs with only 20 percent of the applicants admitted and a 4 percent unfilled capacity in academic year 1982-

83. The Bureau of Health Professions projects that the number of graduates from physical therapy schools will increase from 3,700 in 1980 to 5,200 in 1985 and 5,500 in 1990. The proportion of male graduates is expected to increase slightly from 26 percent in 1980 to nearly 32 percent in 1990. There is some question whether the physical therapy education system is able to meet the demand for trained physical therapists. APTA recognizes this problem but points to a shortage of faculty and the increased curriculum content necessary to prepare students for practice.

Supply and Requirements

According to the American Physical Therapy Association (APTA) data, the total number of employed physical therapists grew from an estimated 4,600 in 1950 to approximately 37,000 in 1984 with about 24,000 (65 percent) of these being full-time salaried workers, 5,400 (15 percent) full-time self-employed, and 3,700 (10 percent) salaried part-time. Nearly two-thirds as many physical therapists, about 2,400, were self-employed and worked part-time. The adjusted 1980 Decennial Census reported 32,200 individuals indicating employment as physical therapists.

The 1983 active member profile of the American Physical Therapy Association (APTA) shows 42 percent were employed in hospital settings, 15 percent in private physical therapy offices, 3 percent in physicians' offies, 9 percent in rehabilitation centers, 6 percent in extended care facilities/nursing homes, 8 percent in home health agencies, 5 percent in school systems, 4 percent in academic settings, and the rest in a variety of other settings (APTA, 1984). Compared to 1978, there was a slight decline in the number of physical therapists employed in hospitals but an increase in the numbers employed in health agencies.

The APTA membership survey also shows the following estimates about the active work force; (1) 72 percent of physical therapists are women; (2) fewer than 5 percent belong to a minority/ethnic group; (3) the median age is just under 33; (4) 79 percent hold a bachelor's degree as their highest academic degree; (5) the percentage of the work force holding a master's or doctoral degree increased from 16 percent in 1978 to nearly 20 percent in 1983 (APTA, 1984); (6) 80 percent work in patient care activities; and (7) the median number of years in the field is 9.

AHA data from 1983 indicate a 6.7 percent vacancy rate for budgeted physical therapy positions. Using estimates of graduates and separations from the work force during the period, the supply of physical therapists is projected by the Bureau of Health Professions to increase from 37,000 in 1984 to 41,000 in 1987 and to 46,000 by 1990 (Table 12-3).

Licensure and Credentialing

All States, the District of Columbia, Puerto Rico, and the Virgin Islands require licensing of physical therapists. Two designations, which vary by State, are currently in use: Licensed Physical Therapists (LPT) and Registered

Physical Therapist (RPT). To be eligible for licensure, a candidate must have a degree or certificate from an accredited educational program and pass a State board examination. Twenty-two States and Puerto Rico require licensure of physical therapy assistants. Six States do not require a physician referral for physical therapy services. In 27 States it is not possible to receive such services without the referral of a physician.

APTA is in the process of developing clinical specialization certificates in six areas and should have these established within the next 5 years. These certifications will be for advanced practitioners with at least 5 years of experience and will include areas such as sports and pediatric physical therapy.

Issues

The occupation is experiencing an increased knowledge base that seems to be outgrowing baccalaureate preparation. APTA is moving toward instituting the master's degree as the entry level degree. Because of the expense involved to the educational programs there has been resistance toward this move. Which position will ultimately prevail is unclear at this time. Another potential issue is the impact of PPS on physical therapy services. Rehabilitation units and hospitals are currently exempt from the system, but proposals for their inclusion are under consideration. A survey conducted by APTA just after the implementation of the system indicated that physical therapists employed in rehabilitation centers and nursing homes were seeing more patients with acute care needs. This study will be followed up by a similar survey in the near future.

Radiologic Technology

Radiologic health services began with the diagnostic use of x-rays and the application of these and other forms of ionizing radiation for a limited number of therapeutic purposes. New specializations rapidly emerged as medical advances and technological developments introduced new equipment and instrumentation. Developments in ultrasound scanning and computerized tomography are currently revolutionizing the field. Radiologic technology now includes a wide variety of services ranging from diagnosis and therapy to radiation health and safety. Radiologic technologists work under the direction of physicians or dentists and do not provide independent services. The 1980 Decennial Census reported 111,700 individuals indicating employment as radiology services personnel (not further defined).

There are three main specialists in the radiologic field: radiographers, who take x-ray films (radiographers) for the use in diagnosing medical problems; radiation therapy technologists, who prepare cancer patients for radiotherapy and administer prescribed doses of ionizing radiation to diseased body areas, operating various kinds of equipment including high energy linear accelerators and particle generators; and nuclear medicine technologists (also known as radioisotope technologists), who participate in or direct various activities involving radiopharmaceuticals in medical diagnosis and treatment. Also important, but not analyzed here, are ultrasound technologists (also known as diagnostic medical sonographers), who use special equipment to transmit sound waves at high frequencies into the body and collect reflected echoes to form an image.

Students and Institutions

The following data for academic year 1983-84 were collected by CAHEA, which accredits radiologic technology programs. There were 760 accredited radiographer programs with a total of 18,247 students and 7,371 graduates. These figures represent relatively little change since 1973 when there were 7,115 radiographer graduates. There were only 943 radiation therapy technologist students and 482 graduates in 98 programs in 1983-84. These 1983-84 numbers for students and graduates represent a fivefold increase since academic year 1973-74. In 1973-74, CAHEA accredited programs for both nuclear medicine technologists and nuclear medicine technicians, but 3 years later the distinction between technician and technologist was dropped, and all are now referred to as technologists. In 1983-84, there were 143 accredited nuclear medicine technologist programs with 1,547 students and 813 graduates.

CAHEA's study of accredited program directors indicated that the numbers of entering students and graduates remained relatively stable between the 1981 and 1984 surveys. Only directors of radiation therapy technologist programs indicated an increase in the number of entering students between 1981 and 1984; in 1981, 80 percent believed that the number of entering students either remained stable or increased, but in 1984, 95 percent held that view.

Supply and Requirements

In 1982 a survey by the American Registry of Radiologic Technologists (AART) indicated that, including full- and part-time workers, there were approximately 80,000 radiographers, 8,000 nuclear medicine technologists, and 3,700 radiation therapy technologists (AART, 1982). The estimated active supply of radiologic service workers in 1984 was 134,000.

The 1983 AHA report showed that of the 98,600 FTE radiologic service workers employed in hospitals, 58 percent were radiographers and 11.6 percent were either radiation therapy technologists or nuclear medicine technologists, the remainder consisting of small numbers of professional personnel such as health physicists and a large assortment of assistants and aides. Similarly, the 1982 AART survey showed that 77 percent of radiographers, 91 percent of nuclear medicine technologists, and 84 percent of radiation therapy technologists were employed in hospitals (AART, 1982). The only other employment setting with any significant concentration was physicians' offices (which employed about one-eighth of all radiographers) with much smaller numbers working in clinics and other health care settings.

AHA data for 1983 indicate a 1.7 percent vacancy rate for all radiologic service workers; 3.1 percent for radiation therapy technologists, 1.8 percent for nuclear medicine technologists, 1.8 percent for radiographers, and 1.4 percent for other radiologic personnel. These figures should reflect the overall requirements for radiologic service workers, considering the high percentage of hospital employment reported by AART. The CAHEA survey of education program directors indicated that only nuclear medicine technologists indicated even a slight shift toward perceived oversupply, from 100 percent considering the occupation to be either in balance with graduates or undersupplied in 1981 to 51 percent in 1984. In 1981, 97 percent considered radiologic therapy technologists were undersupplied and 98 percent held the same opinion in 1984.

Licensure and Credentialing

The number of States licensing radiologic personnel through both educational and examination requirements by professional category are as follows: 15 States license radiographers and 8 States have enabling legislation (4 States are currently drafting licensing legislation); 10 States and Puerto Rico license radiation therapy technologists and 7 States have enabling legislation (2 States are developing programs); 3 States and Puerto Rico license nuclear medicine technologists, 7 States have enabling legislation, and groups in at least 10 States are developing programs to submit to legislatures.

The American Registry of Radiologic Technologists (AART) and the American Registry of Clinical Radiologic Technologists (ARCRT) are the two certifying bodies for radiographers. AART reported 132,155 certificate holders and ARCRT reported 14,011 in 1984. Basically both registries offer certificates to radiography graduates from CAHEA-accredited education programs who pass their examination; in addition ARCRT requires one year of clinical experience.

AART also provides voluntary certification for radiation therapy technologists; 3,555 individuals were certified in 1984. AART requires certificants to have formal education in radiation therapy technology, preferably from a CAHEA-accredited program, and to take an examination.

The Nuclear Medicine Technology Certification Board (NMTCB) and the American Society of Clinical Pathology (ASCP) are the two certifying bodies for nuclear medicine technologists. NMTCB reports 7,870 certificate holders and ASCP reports 8,491 as of 1984. In 1983, ASCP signed an agreement with NMTCB to administer one examination instead of each independently offering its own. Both organizations basically require graduation from a CAHEA-accredited program in addition to the examination.

Issues

Radiologic technology services personnel are concerned about the impact of PPS and DRGs on their profession. They anticipate that the clinically based portions of their education programs will be reduced or eliminated by hospitals looking for ways to adjust for decreased Medicare/Medicaid revenue. From preliminary assessments, the American Registry of Radiologic Technologists anticipates cutbacks in both students and programs in the next 2 years. The AART plans to expand its data base in order to have more accurate information on these trends as well as identify the professional makeup of their membership. They also plan to explore with NMTCB the possibility of merging their examinations.

Respiratory Therapy

Respiratory therapy personnel are employed under medical supervision in the treatment, management, control, life support, diagnostic evaluation, and care of patients with deficiencies and abnormalities associated with the cardiopulmonary system. Respiratory therapy personnel specifically oversee the therapeutic use of medical gases and administration apparatus; ventilatory support; broncho-pulmonary drainage and exercises; respiratory rehabilitation; maintenance of natural, artificial and mechanical airways; and other related duties. The two levels of personnel are respiratory therapists and respiratory therapy technicians. Both the therapists and technicians perform closely related and somewhat similar tasks, but the educational preparation of therapists leads to more extensive knowledge of anatomy, physiology, pharmacology and management. This preparation allows therapists to assume greater responsibility in performing therapeutic procedures based on observation of patients and to participate in administration, supervision, and evaluation of new equipment and therapeutic modalities.

Students and Institutions

In 1983-84 CAHEA accredited 220 programs in respiratory therapy with a total of 9,778 students and 3,306 graduates, and 178 programs for respiratory therapy technicians with a total of 6,999 students and 3,849 graduates. There were only 5 accredited programs in respiratory therapy in 1973-74 with 29 students and 17 graduates. This is a dramatic increase indicating a shift to accreditation. According to the CAHEA program directors survey, 30 percent reported an increase in respiratory therapy students in 1981, but only 14 percent reported such an increase in 1984. The percentages were almost identical for respiratory therapy technicians, with 34 percent reporting student increases in 1981 compared to 10 percent in 1984. Overall, the programs seem to be stable, with from approximately 59-65 percent of the program directors in both occupations reporting stable entering student and graduate levels in 1984.

Supply and Requirements

Based upon a recent survey by the American Association for Respiratory Therapy, an estimated 62,000 persons were employed as respiratory therapy service workers in 1984. Of this group, about 40 percent were male and about 20 percent were minority group members. 1983 AHA data show that the almost 54,000 FTE persons providing respiratory therapy services in hospitals were almost evenly divided between respiratory therapists and respiratory therapy technicians. AART reports that in 1984, 75-80 percent of respiratory therapy technicians and 90 percent of all respiratory therapists worked in hospitals, the remainder being equally divided between comprehensive health care centers and ambulatory settings. The 1980 Decennial Census reported 50,500 individuals indicating employment as either respiratory technologists or technicians.

AHA's survey indicated an overall vacancy rate for respiratory therapy workers in 1983 of 3.1 percent (compared to 5.9 percent in 1981), 3.8 percent for respiratory therapists (compared to 6.7 percent in 1981), and 2.3 percent for respiratory therapy technicians (compared to 4.2 percent in 1981). The number of program directors in CAHEA's survey indicating the profession was undersupplied fell from 97 percent in 1981 to 28 percent in 1984; however, only 2 percent in 1984 felt the occupation was oversupplied, up from 1 percent in 1981. While no respondents indicated an oversupply of respiratory therapy technicians in 1981, 15 percent did so in 1984.

Licensure and Credentialing

Three States have passed bills licensing respiratory therapists (California, New Mexico, and Florida). Nineteen States currently have bills in progress, but there is no indication if and when these pending bills might be enacted.

The National Board for Respiratory Care (NBRC) is the credentialing body for respiratory care personnel and administers two examinations, one at the entry level for certification as a technician, and one for registration which is for the more advanced respiratory therapist. AART currently lists approximately 66,000 certified respiratory therapy technicians and 26,000 registered respiratory therapists.

Issues

Respiratory therapists are concerned with a number of issues. One is PPS and many hospitals' practice of shifting personnel responsibilities. AART sees the possibility of other staff, particularly nurses, taking responsibility for respiratory care functions and anticipates that some hospitals may eliminate respiratory care departments. They fear that these hospitals would only maintain respiratory care services for intensive care units, where 70 percent of respiratory care takes place. A second area of concern deals with the desire for increased recognition and quality control of services through State licensure. A third area of concern is third-party reimbursement by Medicare and Medicaid for respiratory therapy patients outside the hospital setting. There is a belief in the field that this change would allow ventilator patients to return home earlier, thereby saving inpatient hospital costs. Currently, reimbursement is allowed for equipment but not for respiratory therapy services in the home.

Speech-Language-Hearing

Speech-language pathologists and audiologists provide specialized assistance to persons with communication problems, focusing on disorders in the production, reception, and perception of speech and language. In clinical practice, speech-language pathologists and audiologists identify individuals who have such disorders and determine the etiology, history, and severity of afflictions through interviews and special tests. They plan and facilitate optimal treatment through remedial procedures, counseling, and guidance. Speech pathologists diagnose and treat individuals who suffer from disorders in oral language. Audiologists identify and measure hearing loss, work to rehabilitate those with hearing impairments, and issue hearing devices. In nonclinical settings, teaching is the major function for both specialists.

Students and Institutions

The American Speech-Language-Hearing Association (ASHA), Council of Professional Standards, University Educational Standards Board, reviews and certifies 146 master's degree programs out of a total of 234 programs in speech pathology and audiology. Nine additional programs are in the process of being certified. ASHA reports that there are 307 undergraduate programs, only 70 of which offer no further degree at the master's level, and 61 doctoral degree programs with 2 offering only the doctoral degree. In academic year 1983-84 ASHA reported 15,900 students and 4,800 graduates from undergraduate programs and 8,900 students and 4,000 graduates from graduate programs. ASHA reported an 11 percent decrease in undergraduate enrollments and a 2.5 percent decrease in graduate enrollments for academic year 1983-84. The master's degree is required for certification, with undergraduate degree recipients mainly working under the supervision of certified speech pathologists or audiologists. The National Council on Graduate Programs in Communication Sciences and Disorders reports that minority students represent 10 percent of the enrollment in speech, language and hearing programs; the trend is toward an increase in minority professionals (Kingsley, 1984).

Supply and Requirements

According to recent data published by the American Speech-Language-Hearing Association, the number of employed speech-language pathologists and audiologists has more than doubled since 1970 to approximately 52,000 in 1984, the great majority being speech pathologists. ASHA also estimates in its pamphlet "Career Information for Minority Students" that only 4 percent of current speech-language pathologists and audiologists are members of racial minorities -- only one minority speech-language pathologist or audiologist for every 4,466 persons with communication disorders. The adjusted number of individuals reporting employment as speech therapists and audiologists in the 1980 Decennial Census was 39,800. ASHA employment information on its 30,000 members shows the following distribution by work setting: 11.6 percent or 3,466 in colleges or universities; 43.3 percent or 13,004 in schools; 4.8 percent or 1,448 in government health and education; 18.8 percent or 5,640 in university clinics, hospitals or rehabilitation centers; and 6.1 percent in various other settings.

AHA reported in 1983 a vacancy rate of 4.2 percent for speech-language pathologists/audiologists; however, hospitals are not a large employer of these occupations. In nonhospital settings, including schools, services for the elderly, and services in rural settings, there appears to be a shortage of speech-language pathologists and audiologists. The Seventh Annual Report to Congress on the Implementation of the Education of the Handicapped Act (DE 1985) reported 19,632 speech pathologists/teachers and 20,152 speech-language pathologists employed during the 1982-83 school year. The report indicates an additional need for 1,212 teachers and 2,306 pathologists for the speech and hearing impaired.

Certification and Licensure

Thirty-six States currently license speech pathologists and audiologists. Four additional States are actively pursuing licensure, six States are interested and are discussing the possibility, and five States have indicated no interest.

The Council on Professional Standards of the Speech-Language-Hearing Association issues a certificate of clinical competence to qualified clinical practitioners in speech pathology and audiology. This certificate requires a master's degree from an accredited program that includes 300 hours of practicum, a clinical fellowship year under the supervision of a certified speech pathologist or audiologist, and completion of a national examination.

Issues

The professions of speech pathology and audiology are concerned about the invisibility of hearing disorders and the numbers of individuals who go undiagnosed. They are particularly concerned about the growing number of elderly persons in our society and their hearing impairments. ASHA is also very concerned about the decline in Federal support for educational programs in speech pathology and audiology, which may reduce the supply of students and practitioners in the field. In 1985, the Rehabilitation Services Administration, Department of Education, stopped funding long-term training for speech-language-pathology students.

Trends in the Allied Health Profession

The allied health professions showing the greatest growth between 1980 and 1984 were speech pathology and audiology. The number of speech pathologists and audiologists grew by about 24 percent, from 42,000 to approximately 52,000. Dietetic service personnel experienced a 4-year growth of about 22 percent, to an estimated 38,000 dietitians and 6,000 dietetic technicians. Occupational therapists grew from 25,000 in 1980 to 30,000 in 1984, a 20 percent increase. Allied health occupations that experienced the most substantial growth rates during the past 4 years almost surely did so in response to vigorous service demand, and it is expected that strong demand for these occupations will continue.

According to independent estimates made by the Division of Associated and Dental Health Professions, Bureau of Health Professions, the allied health work force increased by about 13 percent between 1980 and 1984, to a total of 1,235,000. The major allied health occupational groups showing the smallest growth were respiratory therapy (11 percent growth to 62,000 workers), and clinical laboratory personnel, excluding cytotechnologists, (12 percent growth to 278,000 workers).

Almost every allied health occupation showed a drop in student levels for 1983-84. Some of these were due to the closing of programs, while others were due to a reduction in the number of entering students in programs such as those in the medical record and occupational therapy fields. In the clinical laboratory fields, only cytotechnology programs indicated a significant increase in the number of entering students. Physical therapy, currently a high-demand occupation, saw a 23 percent increase in graduates between academic years 1976-77 and 1979-80, but a smaller increase of 7.5 percent from 1979-80 to 1982-83. Radiologic technology programs showed no significant change in the numbers of students and graduates, except for radiologic therapy technologist programs, which have continued to enroll more students and produce more graduates. Respiratory therapy programs showed some decrease in the number of entering students but remained relatively stable for academic year 1983-84. There was also a decline in student enrollment in programs for speech-language-hearing pathologists and audiologists, despite the fact that these are high-demand occupations.

Conclusions

This chapter has touched on a number of areas that affect the status of the allied health professions, as well as changes occuring in the health care field that may have future status implications. These include issues brought out in the Introduction and in sections on specific professions, such as data availability and requirement projections; licensure and continuing competency of professionals; cost-containment efforts including Medicare's Diagnostic Related Groups for hospital reimbursement and other prospective payment systems, and the related but differential effect such developments will have on the clinical portions of certain allied health educational programs.

Data and Requirements Projections

As discussed in the Introduction, useful modeling of future demand for allied health professionals is restricted by a shortage of valid data. Changes in organization, financing, and delivery of health services could have substantial impact on allied health professionals, who comprise a major part of the health services work force. Although a future surplus of allied health professionals is expected, most graduates currently find employment.

Competency Assurance

Many allied health occupational groups are pursuing State licensure in order to gain professional recognition and increased compensation that generally accompany this form of regulation. Lack of recognition in the past has meant limited financial support for education, training, and research in allied health fields. Many practitioners in unlicensed professions find that the services they can provide are limited. These limitations do not necessarily reflect on their professional qualifications, but tend to be due to restrictions imposed by State practice acts that license professional groups with overlapping or similar functions. Another factor motivating allied health practitioners to seek licensure or certification is that such requirements are necessary for the employing institution to meet reimbursement standards.

Many States are now reassessing their roles in the licensure process. Since 1976, approximately 30 States have conducted "sunset" reviews of their health regulatory agencies, including licensure boards, to determine the continued necessity for regulation and the boards' administrative efficiency and effectiveness. States are also moving to examine other alternatives to licensure such as regulation and certification.

There is little consistency among States in their regulation of the allied health professions. To address this issue, the Bureau of Health Professions awarded a contract in 1983 to the Council of State Governments to fund a Licensure Information System. This system provides State, private, and Federal audiences with a digest of timely and up-to-date information on State credentialing practices, requirements, and trends.

Methods for determining the continuing compentency of health professionals also lack continuity. Although continuing education is regarded as one means of assuring continued compentency, it is not always considered the most effective way. Other approaches such as peer review, practice audits, reexamination, simulations, self-assessment techniques, and supervisory assessments are also receiving attention. Little research has been conducted to determine the most effective methods for ensuring continued competence. The Bureau of Health Professions awarded a contract in 1984 to the National Commission for Health Certifying Agencies to determine the state of the art in continuing compentency activities in the health professions and to establish a research agenda.

Impact of PPS and Other Cost Containment Efforts

The most profound short-range impact on both education and employment of many allied health professions may come in the form of new systems for reimbursement of patient care and cost containment. Of these changes, the prospective payment system (PPS) for hospitals serving Medicare-eligible patients seems likely to have the most immediate and widespread impact on the way hospitals do business. Since October 1, 1983, 5,200 hospitals have been operating under PPS.

The cornerstone of PPS and the basis for payment is the diagnostic-related group (DRG) system, which classifies patients on the basis of diagnosis and makes predetermined payments accordingly. Reimbursement under PPS will vary in impact on the services provided by different allied health occupation groups. One interesting reversal attributed to PPS, according to reports from some hospitals, is that departments such as clinical laboratory and radiology, which previously generated income under a cost-based reimbursement scheme, are now areas in which costs can exceed PPS payments.

Clinical Education

Clinical practicums for students are usually provided in hospitals and are supported by patient-generated income. Decreasing direct-patient and third-party payments may cause educational programs to find other payers (such as schools, students, direct private or government funding). Shifting clinical training to simulated classroom experience, or fundamentally changing the clinical experience degree requirements are among the methods being discussed within various affected professions to deal with changes in funding.

It is difficult to answer the basic questions of who pays, how much, and who controls clinical education because (1) an adequate data base on clinical education programs is lacking; (2) cost analyses for specific kinds of clinical training are limited; (3) there is disagreement on the value of student services to the facilities used as training sites; and (4) a wide variety of arrangements exists between educational institutions and clinical facilities. At this point, barely a year following the installation of PPS, the data are largely anecdotal, although some studies are beginning to surface. One such study, reported by CAHEA in January 1985, surveyed 2,850 program directors for their perceptions of the impact of PPS on clinical education for allied health students, with 2,115 questionnaries returned. Some impacts and the number of program directors reporting them are shown in the following table:

Impact	No.
Termination of affiliation contracts	131
Announced future termination of affiliation contracts	70
Changed patterns of clinical experience	459
Program closings, anticipated closings, probable closings	266

Based on this survey CAHEA estimated that approximately 44 percent of the entire system of contractual clinical affiliations reported some direct impact from the partially implemented and still very new payment system. CAHEA further estimated that these early direct impacts will at least double as other hospitals are subject to PPS and/or have time to determine what the impact will be.

Some positive steps to cope with the early effects of PPS were also reported, such as increased efficiency, cost monitoring, and shifts in program sponsorship. Medical Records Administrator/Medical Records Technician programs actually anticipated some increased demand from PPS. A similar study conducted by AOTA reported in 1985 showed no direct negative impact from PPS for the occupational therapy departments of hospitals.

Summary

- After a long period of growth driven by increased use of health services and technological development, the major allied health professions appear to be experiencing adjustments similar to those in other parts of society and the economy. Applications and admissions have shown a downward trend overall, but remain high for some occupations.

- Some mixed trends among specific professions accentuate the need to develop more reliable and occupation-specific work force data. There is a need to examine the relationship between these occupational groups and their primary employers and employment settings and to consider their comparatively low educational costs in the face of growing constraints on the overall cost of patient care.

- It is increasingly evident to Federal, State, provider, and educational institutions that improved methods are needed for analyzing the impact of changes in health care delivery and financing on both the utilization and education of allied health professionals.

- Careful monitoring by accrediting bodies, professional associations, State licensing boards, and the Federal Government will be necessary to ensure that allied health professions can continue to provide unique, necessary, and high-quality care services in the health system at effective costs.

- An adequate supply of applicants, entering students, graduates, and practicing professionals needs to be maintained in allied health fields.

Table 12-1. ESTIMATED NUMBER OF ALLIED HEALTH PERSONNEL EMPLOYED IN THE UNITED STATES: SELECTED YEARS, 1970-1984 1/

Occupation	1970	1975	1980	1984
Allied health personnel	670,000	881,000	1,091,000	1,235,000
Dental hygienists	15,000	27,000	38,000	46,000
Dental assistants	112,000	134,000	156,000	168,000
Dental laboratory technicians	31,000	42,000	53,000	59,000
Dietitians	17,000	23,000	32,000	38,000
Dietetic technicians	2,000	3,000	4,000	6,000
Medical record administrators	10,000	12,000	13,000	15,000
Medical record technicians	42,000	53,000	64,000	72,000
Medical laboratory workers:	135,000	191,000	249,000	278,000
Medical technologists	(57,000)	(93,000)	(138,000)	(162,000)
Cytotechnologists	(3,000)	(6,000)	(7,000)	(8,000)
Medical laboratory technicians	(1,000)	(8,000)	(13,000)	(15,000)
Other laboratory workers	(74,000)	(84,000)	(91,000)	(93,000)
Occupational therapists	17,000	21,000	25,000	30,000
Physical therapists	15,000	20,000	31,000	37,000
Radiologic service workers	87,000	97,000	116,000	134,000
Respiratory therapy workers	30,000	43,000	56,000	62,000
Speech pathologists and audiologists	22,000	32,000	42,000	52,000
Other allied health personnel 2/	135,000	183,000	212,000	238,000

1/ All numbers are rounded to the nearest thousand. Due to revisions and independent estimations, some numbers may differ from those that appear elsewhere.

2/ Includes such categories as dietetic assistant, genetic assistant, operating room technician, ophthalmic medical assistant, optometric assistant and technician, orthoptic and prosthetic technologist, pharmacy assistant, occupational and physical therapy assistants, physician assistant, podiatric assistant, vocational rehabilitation counselor, other rehabilitation services, and other social and mental health services.

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions, February 1985.

Table 12-2. NUMBER OF ACTIVE OCCUPATIONAL THERAPISTS, BY SEX: ESTIMATED 1980-1984, AND PROJECTED 1985-1990

Year	Number of active occupational therapists	Male occupational therapists	Female occupational therapists	Percent male of all occupational therapists
1980	25,000	1,600	23,400	6.2
1981	26,200	1,700	24,500	6.4
1982	27,500	1,800	25,700	6.5
1983	28,800	1,900	26,900	6.7
1984	30,000	2,000	28,000	6.8
1985	31,200	2,200	29,000	7.0
1986	32,500	2,300	30,200	7.1
1987	33,700	2,500	31,200	7.3
1988	35,000	2,600	32,400	7.4
1989	36,200	2,800	33,400	7.6
1990	37,500	2,900	34,600	7.7

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

Table 12-3. NUMBER OF ACTIVE PHYSICAL THERAPISTS, BY SEX: ESTIMATED 1980-1984, AND PROJECTED 1985-1990

Year	Number of active physical therapists	Male physical therapists	Female physical therapists	Percent male of all physical therapists
1980	31,000	8,000	23,000	25.8
1981	32,500	8,700	23,800	26.8
1982	34,000	9,400	24,600	27.6
1983	35,400	10,000	25,400	28.2
1984	37,000	10,700	26,300	28.9
1985	38,000	11,100	26,900	29.2
1986	39,400	11,700	27,700	29.7
1987	40,800	12,300	28,500	30.1
1988	42,200	13,000	29,200	30.8
1989	43,600	13,600	30,000	31.2
1990	45,000	14,400	30,600	32.0

SOURCE: Health Resources and Services Administration, Bureau of Health Professions, Division of Associated and Dental Health Professions.

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